DOCUMENT RESUME

ED 195 372	RC 012 376

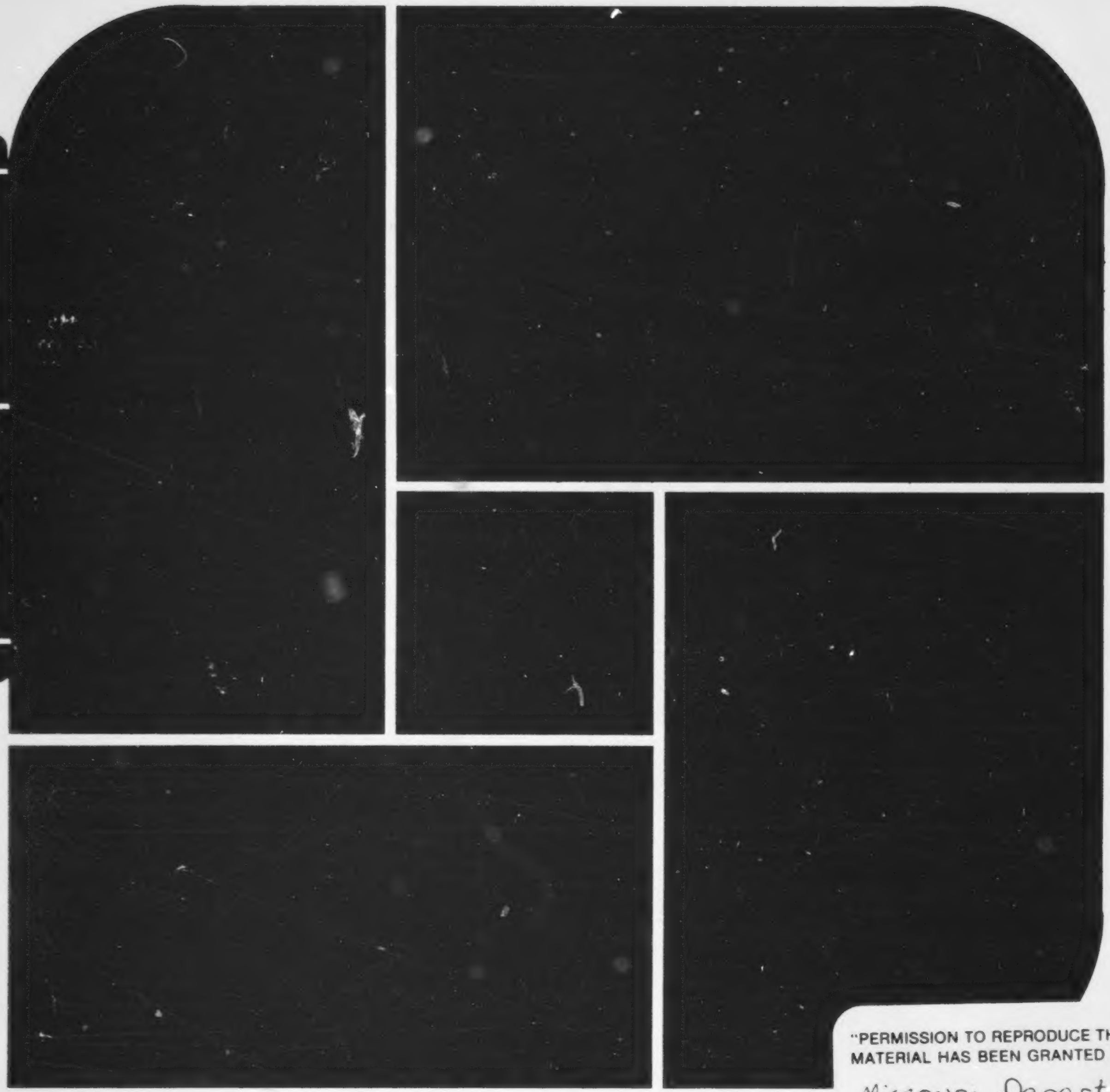
AUTHOR	Staton, Robert D., Jr.
TITLE	Casting Equipment. Casting and Angling Skills Series. Instructor Manual.
INSTITUTION	Missouri Dept. of Conservation, Jefferson City.: Missouri State Dept. of Elementary and Secondary Education, Jefferson City.
PUB DATE	80
NOTE	86p.
EDRS PRICE	MF01/PC04 Plus Postage.
DESCRIPTORS	*Conservation (Environment): *Equipment: Equipment Maintenance: Equipment Standards: Equipment Storage: *Instructional Materials: *Lesson Plans: Outdoor Education: Recreational Activities: *Skill Development
IDENTIFIERS	*Fishing: *Knot Tying: Missouri

ABSTRACT

Part of a series of self-contained instructional units designed by the Missouri Department of Conservation to teach Missourians how to use outdoor resources wisely and skillfully, the instructor manual, the first in the casting and angling series, is intended both as a reference book on casting equipment and as an introduction to the sport. Although primarily directed toward the classroom teacher, the manual may be adapted for use by other youth groups as well. An introduction notes the educational goals and objectives of the manual and contains a discussion of the concerns and responsibilities of those who use Missouri waters for sport fishing. The manual includes the information necessary to teach the basics of freshwater casting equipment (history, hooks, reels, rods, lines), nomenclature, the tying of basic knots, and the selection of appropriate equipment. The discussion is illustrated with black and white drawings. The basic information is further organized into four 50-minute class presentations, each with a purpose, methodology, necessary instructional aids and facilities, an outline of the presentation, appropriate exercises, and a final examination and skill test. A glossary, bibliography, and student handouts complete the manual. (SB)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED195372



RC 012376

CASTING EQUIPMENT

CASTING AND ANGLING SKILLS SERIES

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Missouri Department of Conservation
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

A PROGRAM OF THE MISSOURI DEPARTMENT OF CONSERVATION

OUTDOOR SKILLS EDUCATION MODULES

Missouri's natural resources belong to all its citizens. More and more people are going outdoors to hunt, fish, boat, hike, camp, explore, and learn about nature. The skills they use in the outdoors can have a direct effect on resources. That's why it is important to educate youth and adults in how to use the outdoors wisely and responsibly through schools, community groups, and agencies.

The Outdoor Skills Education Unit of the Department of Conservation, in cooperation with the Department of Elementary and Secondary Education, is developing educational programs to teach Missourians how to use wisely and skillfully the state's many resources for outdoor recreation. The materials, presented as modules, can be used individually or combined in a series by schools, camps, clubs, scouting groups, and other youth or adult organizations. Topics include the shooting sports, casting and angling, trapping, archery, backpacking, camping, aquatics, map and compass, and other skill areas.

Each module is a self-contained unit that includes information on the subject, lesson plans, activities, class exercises, tests, suggested visual aids, and references. Experienced instructors who have taught the subjects and successfully used the activities have written the modules.

For additional information on conservation and outdoor education programs, write the Education Section, Missouri Department of Conservation, P.O. Box 180, Jefferson City, MO 65102.

A Design for Conservation program funded by the 1/8 of 1% Conservation Sales Tax, Amendment No. 1, passed in 1976.

INSTRUCTOR MANUAL

NOV 1980
ERIC/CRESS
RECEIVED

CASTING EQUIPMENT

CASTING AND ANGLING SKILLS SERIES

MISSOURI DEPARTMENT OF CONSERVATION
EDUCATION SECTION

By Robert D. Staton, Jr.

Cheryl Riley Powell, Editor and
Production Coordinator
Martha Green, Production Assistant
Donna Drew, Illustrator

For information, contact:
Outdoor Skills — Education Section
Missouri Department of Conservation
P.O. Box 180
Jefferson City, MO 65102
314/751-4115

Copyright © 1980 by Missouri Conservation Commission

Pages marked "Student Handout" may be reproduced by instructors for class use. Other reproduction may be granted upon request.

About the author

Bob Staton has been an Outdoor Skills Education Specialist for the Missouri Department of Conservation since August 1978. Before that he taught and coached at DeKalb High School in northwest Missouri. While at DeKalb he instituted and taught an outdoor skills class in addition to teaching junior and senior high physical education.

Bob holds B.S.E. and M.S.E. degrees from Central Missouri State University. As a graduate assistant at C.M.S.U., he created and taught a graduate-level course entitled "Casting and Angling Instruction." He also has taught casting and angling at state and regional outdoor education workshops for the past six years.

Bob has been an avid Missouri angler for the last 25 years. He lives in California, Missouri, with his wife, Debbie, and two sons, Michael and Thad.

How to use this module

This module has been produced for you who teach or work with youth. The material has been written with the classroom teacher in mind, but it also can be adapted by leaders of camps, 4-H clubs, scouting organizations, and other youth groups. A variety of information and activities has been included to make the module useful to as many groups as possible. Each module may be used individually or combined with other modules for a more extensive course. The Casting Equipment module is the first in the Casting and Angling series. It should be used as a reference on casting equipment and as an introduction to the sport.

The Casting Equipment module contains:

Introductory Information — Questions such as "Why teach this subject?" are answered. Also, goals and objectives approved by the Missouri Department of Elementary and Secondary Education are established. A brief history of the subject is given as background and a means of introducing the subject.

Ethics — This module addresses what should be some of the ethical concerns and responsibilities of individuals who use Missouri lakes, rivers, and streams for fishing.

Subject Information — This section provides the information necessary to teach students the basics of freshwater casting equipment, nomenclature, how to tie some of the basic and more important knots, and how to select their own equipment to meet their particular needs.

Lesson Plans — Field-tested methods of teaching this material are provided in four lesson plans. The time for each lesson is only suggested and will vary from instructor to instructor. All equipment and materials needed for the activities are listed.

Student Handouts — The following appendixes are included: hook nomenclature, hook power demonstration, fly rod and reel nomenclature, spinning rod and reel nomenclature, spin-casting rod and reel nomenclature, bait-casting rod and reel nomenclature, and a crossword puzzle. These are designed to be reproduced for students.

Suggested written test — If you are a classroom teacher and want to evaluate your students' mastery of the material you have been teaching, a sample written examination is included along with a suggested skills test. Test questions are keyed directly to the objectives for the module.

Glossary and Bibliography — These are provided as additional information which may help in teaching the subject in more detail.

Outdoor Skills Education Specialists are assigned to seven regions throughout the state. They will assist you in obtaining materials and scheduling equipment and films that are available from the Department of Conservation. They also offer workshops to provide training and certification in several outdoor skills, including casting and angling. Check the last page of this module for names, addresses, and regions.

Review Committee

The material in this module has been reviewed by the following people:

Woody Bledsoe
Radio-TV Specialist
Missouri Department of Conservation
Jefferson City, MO

Paul Cowie
Department Chairperson of Physical Education
Hillsboro Senior High
Hillsboro, MO

Don Deaton, Ph.D.
Coordinator of Health & Physical Education
Missouri Western State College
St. Joseph, MO

John M. Sweeney
Vice-President of Marketing
Wright & McGill Company
Denver, CO

Robert M. Taylor, Ph.D.
Director of Health, Physical Education, and Recreation
Missouri Department of Elementary and Secondary Education
Jefferson City, MO

Fred Vasey
Fisheries Research Supervisor
Missouri Department of Conservation
Columbia, MO

Questionnaire

Please help us evaluate the effectiveness and use of our materials by completing the following questionnaire and mailing it to the Missouri Department of Conservation, Outdoor Skills Education, P. O. Box 180, Jefferson City, MO 65102.

How did you obtain a copy of this module? ____________________

Have you used this material? Why or Why not? ____________________

Your position ____________________

Age group you teach ____________________

CONTENT AND FORMAT

Were you given enough information to teach this course?
Enough ________ Not Enough ____ Too Much ______

Comments: ____________________

____

Was material presented in a manner easy for you to use?
Yes ____________ No ____________

Comments: ____________________

____

What information would you add or subtract? ____________________

____

LESSON PLANS AND ACTIVITIES

Did you use the lesson plans? All of them _____ Some of them _____ None of them _____

Were the time periods allowed for activities adequate? Adequate _____ Too much time _____ Not enough time _____

Comments: ____________________

____

____

Which activities did students most enjoy? ____________________

What additional activities would you include? ____________________

What suggestions do you have for future modules? ____________________

What topics would you like to see covered? ____________________

Contents

3 About the author
3 How to use this module
4 Review Committee
5 Questionnaire
8 The Missouri Department of Conservation
9 Topic Outline
12 INTRODUCTION
12 Goals of the module
12 Purpose of the module
12 Content of the module
12 Objectives
13 ETHICS
14 HISTORY AND INTRODUCTION TO EQUIPMENT
19 FRESHWATER CASTING EQUIPMENT
19 Balanced Casting Equipment
21 Fishing Rods
26 Fishing Reels
28 Fishing Lines
32 KNOTS
37 SELECTING FRESHWATER EQUIPMENT
37 Cane Poles
39 Fly-Casting Equipment
42 Bait-Casting Equipment
44 Spinning Equipment
47 Spin-Casting Equipment
50 LESSON PLANS
51 No. 1
56 No. 2
59 No. 3
65 No. 4
65 Suggested Examination
65 Suggested Skill Test
66 GLOSSARY
70 BIBLIOGRAPHY
72 APPENDIXES
72 Appendix 1 — Parts of a Hook
73 Appendix 2 — Fishing Reels
74 Appendix 3 — Parts of a Fishing Rod
75 Appendix 4 — Knots
77 Appendix 5 — Casting Equipment Crossword Puzzle
80 Appendix 6 — Personal Casting Equipment Selection Guide
82 Instructor's Key to Crossword Puzzle
83 Specialists' Regions
84 Consultants' Regions

The previous numbered page in the original document was blank.

The Missouri Department of Conservation

COMMISSIONERS	W. Robert Aylward
	J. Ernest Dunn, Jr.
	Carl DiSalvo
	Jack Waller
DIRECTORS	Larry R. Gale, Director
	Allen Brohn, Assistant Director
	Osal B. Capps, Assistant Director
	Charles A. Purkett, Jr., Assistant Director
EDUCATION	Clarence E. Billings, Superintendent of Education
	Patti Daley, Secretary
OUTDOOR SKILLS EDUCATION	F. E. "Bud" Eyman, Assistant Superintendent
	Cheryl Riley Powell, Projects Coordinator
	Barbara Brandes, Secretary
	Martha Green, Secretary
	Patti Baker, St. Louis
	Louis F. Diebold, Savannah
	Richard Flint, Aurora
	Wayne Martin, Kirksville
	Robert D. Staton, Jr., California
	Lloyd Williams, Kansas City
	Stephen J. Wilson, Jackson
CONSERVATION EDUCATION	Donald K. Heard, Assistant Superintendent
	Marcia Z. Guckes, Projects Coordinator
	Freida Fisher, Secretary
	Ross Allen, Springfield
	Larry Behrens, Shelbina
	Hollis D. Crawford, Gibbs
	Virgil L. Davis, Houston
	Rodney J. Green, Albany
	Gordon S. Griffin, Charleston
	Wendell Jeffery, Eldon
	Neil W. Jenkins, Lee's Summit
	Charles D. Jordan, Knob Noster
	David B. Knisley, Fenton
	Al Palladino, Marthasville
	Jim Pyland, Kearney
	Harold W. Thiele, St. Louis
	Jack C. Woodhead, Eureka

Topic Outline

History and Introduction

I. Early Methods of Fishing
  A. Hand fishing or noodling
  B. Clubbing
  C. Nets, seines, and traps
  D. Spears and gigs
  E. Bow and arrow
  F. Gorge and hooks

II. Fish Hooks
  Design

III. Fishing Lines
  A. Early materials
  B. Cotton and silk
  C. Synthetics

IV. Fishing Rods
  A. Early Materials
  B. Modern materials

V. Fishing Reels
  A. Fly
  B. Bait-casting
  C. Spinning
  D. Spin-casting

Freshwater Casting Equipment

I. Balanced Equipment
  A. Rod and reel relationship
  B. Reel and line relationship
  C. Rod and lure relationship
  D. Lure and line relationship
  E. Rod and line relationship

II. Rods
  A. Materials
  B. Rod actions
  C. Ferrules
  D. Grips and reel seats
  E. Guides
  F. Basic care and storage

III. Reels
  A. Fly
    1. single action
    2. automatic
  B. Bait-casting
  C. Spinning
  D. Spin-casting
  E. Selection and care

IV. Lines
  A. Characteristics
    1. stretch
    2. abrasion resistance
    3. knot strength
    4. impact resistance
    5. rigidity
  B. Types
    1. monofilament
    2. braided
    3. fly
      a. weight
      b. floating and sinking
      c. leaders
  C. Care and storage

Knots

I. Line-to-line
  A. Basic blood knot
    1. when to use
    2. how
  B. Double strand blood knot
  C. Perfection loop knot
  D. Dropper loop knot

II. Line-to-leader
  A. Jam knot
  B. Tucked sheet bend knot
  C. Nail knot

III. Line-to-lure
  A. Improved clinch knot
  B. Clinch knot
  C. Loose loop clinch knot
  D. Palomar knot
  E. Double turle knot
  F. Quick snell knot

IV. Line-to-reel spool
    Overhand slip knot

Selecting Freshwater Equipment

I. Cane Poles
  A. Poles
  B. Line
  C. Uses
  D. Basic care and storage
  E. Advantages
  F. Disadvantages

II. Fly-Casting Equipment
  A. Rods
  B. Line
  C. Reels
  D. Basic care and storage

  - E. Advantages
  - F. Disadvantages

- III. Bait-Casting Equipment
  - A. Rods
  - B. Reels
  - C. Line
  - D. Basic care
  - E. Advantages
  - F. Disadvantages

- IV. Spinning Equipment
  - A. Rods
  - B. Reels
  - C. Basic care
  - D. Advantages
  - E. Disadvantages

- V. Spin-Casting Equipment
  - A. Reels
  - B. Rods
  - C. Basic care
  - D. Advantages
  - E. Disadvantages

Introduction

Goals of the module

To prepare individuals to choose, and then maintain, the casting equipment that would best serve their personal needs.

Purpose of the module

More than 60 million Americans go fishing each year, making this sport one of our most popular outdoor activities. Its popularity is due in part to the much improved quality of today's casting equipment. By knowing what's available, a person can then make a wise choice as to the best type or types of casting equipment to meet his or her personal needs.

This module should serve as a reference guide for selecting casting equipment, maintaining it, and understanding how it functions. Successful fishing encompasses many variables, but the first step is the wise choice and use of good quality equipment.

Content of the module

The Casting Equipment module is the first in the casting and angling series. It introduces the sport of fishing, gives a historical background, and explains in-depth the basic types of freshwater casting equipment. Also included is information on how to tie some of the basic knots needed when fishing.

The material is organized into four 50-minute presentations. Upon completion of this material, students should have a thorough understanding of the various types of equipment, how they best work together, and for what situations they should be used. Several appendixes are included that can be reproduced for student handouts. They will supplement class lectures and demonstrations.

Objectives

At the completion of the instruction, the student should be able to do the following:

1. Select a rod, reel, and line to be used for the type of fishing he or she plans to be doing.
2. Write a short essay or verbally explain why that type of equipment was chosen.
3. Write or explain how to store and maintain the equipment chosen.
4. Successfully tie the following knots:
    - a) improved clinch knot
    - b) clinch knot
    - c) loose-loop clinch knot
    - d) quick snell knot
    - e) basic blood knot
    - f) double-strand blood knot

Ethics

Missouri is blessed with many streams, rivers, ponds, and lakes. The future of fishing in our state depends on our water resources maintaining a high enough quality to support Missouri's some 202 different species of fish.

Clean water conservation is the responsibility of everyone and especially those who fish and want future generations to be able to enjoy the sport of fishing. Water is polluted by industrial wastes, sewage, siltation from soil erosion, and poor agricultural practices. Unwise damming of streams and rivers also can cause problems.

The right to vote is an important weapon against water pollution. Concerned fishermen should study issues involving water resources and cast an informed vote whenever possible.

Another water quality problem that we all must face is litter. Trash and garbage in the form of empty bait containers, soda and beer cans, six-pack holders, food wrappers, pop-tops, and tangled fishing line contribute to a pollution problem that is compounded by the millions of fishermen in Missouri. Every fisherman has the responsibility to help end this problem by setting a personal example for others to follow. Mark Twain once said that "Few things are harder to put up with than the annoyance of a good example."

Pollution and litter are only some of the ethical concerns that must be addressed. Many fishermen who have gone home empty-handed have not considered the day a waste because they have enjoyed the many pleasures of just goin' fishin'. An important motto of ethical fishermen is "take only what you need." Those who enjoy the sport do not always keep what they catch. Catching and releasing fish can provide enjoyment and still conserve the resource.

Future modules will discuss casting safety, water safety, ethical use of boats and motors, proper methods of releasing fish, laws and regulations, landowner relations, and many common fishing courtesies.

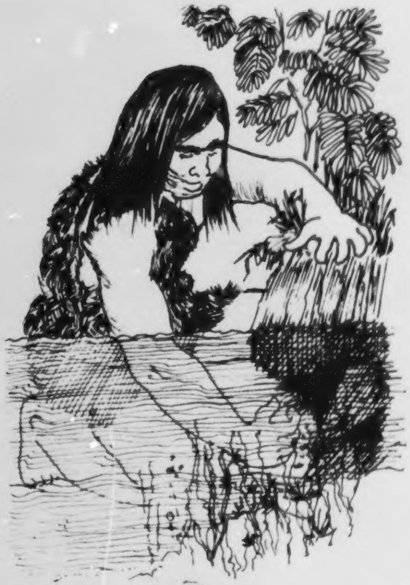
History and Introduction to Equipment

Early methods of fishing

Fishing, one of our oldest outdoor activities, began as a quest for food, but it has developed into a favorite sport and leisure activity. Fossil records, old paintings, and books give a somewhat sketchy story of the earliest attempts at fishing.

HAND FISHING

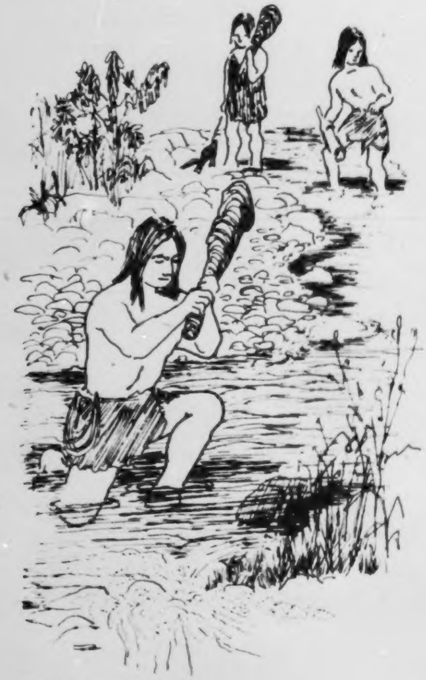
One of the earliest methods of fishing was simply hand fishing, or noodling. This method, however, was slow and not very successful. Since some fish of that time had rows of razor sharp teeth, the fisherman's hand sometimes became the meal instead of the fish. Today hand fishing is illegal because it takes advantage of fish during breeding season.



Hand fishing.

CLUBBING

To combat the danger of losing fingers or a hand, primitive people started using clubs to stun or kill fish before lifting them from the water. This method consisted of wading shallow backwaters of lakes or riffles of streams and clubbing fish that swam by. Sometimes fishermen worked in groups with some of them driving the fish toward the clubbers. While this method markedly increased their success, it could never produce enough fish to support a large tribe.



Clubbing fish.

NETS

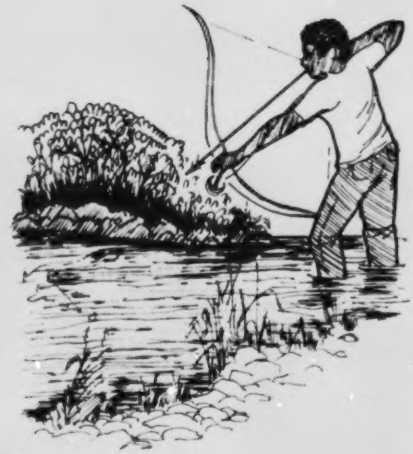
A more successful method evolved after people learned to weave. Primitive tribes wove reeds, vines, bamboo, and hair into various types of nets, seines, and traps. This method of fishing, still used today, was successful but the size of the net limited what was caught, and fish with sharp teeth often damaged or destroyed nets.

SPEARS

As people began to fashion tools and weapons from wood, stone, bone, shells, and various other materials, one of their early implements was the spear, which they learned to use for self defense as well as for hunting and fishing. This new invention was further improved for fishing by fashioning spears with barbed points. Today scuba divers as well as giggers use spears when fishing.

BOW AND ARROW

From the spear evolved the bow and arrow, which greatly increased early man's effectiveness as a hunter, especially when he learned to use a bow and barbed arrow to shoot fish. Gigging and bow and arrow fishing are both popular today, but they are restricted to prescribed seasons, species not commonly caught by regular angling methods, or lesser used species.



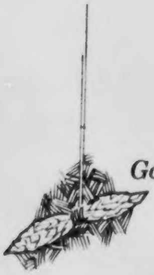
Bowfishing.

While the methods described were somewhat successful, they were all severely limited. What was needed was a method of catching fish from deep water that could be done by one person without a group needed to help.

GORGE

The first step in this direction was the development of the gorge. The gorge was a short shaft tapered to a point at each end with a line secured around a groove in the middle. It could be embedded lengthwise in bait. After it was swallowed, a pull on the line caused the pointed shaft to cross in the fish's gullet and become trapped. Then the line was hauled in hand over hand.

The gorge was used successfully through the Middle Stone Age. Just before the dawn of the New Stone Age, what is considered the most important piece of equipment used by fishermen — the hook — was invented.



Gorge.

Hooks

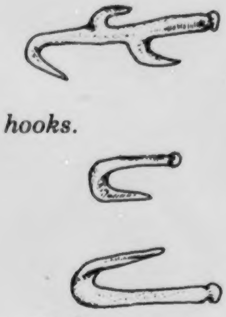
The first hooks were recurved, single-pointed fish hooks made of bone. They were more successful than the gorge because fish did not have to swallow the bait to be caught. Through the centuries fishermen experimented with various materials for making hooks. Bone, thorns, polished stone, shells, and bronze were the most common materials used. Fish hooks made of bronze with a barbed point and a turned-down flattened shank terminal with a hole in the end were made and used in Crete and neighboring countries about 3400 B.C.

Steel fish hooks were the next big stride. Although steel hooks, both with and without barbs, were used centuries before the Christian Era, modern methods of fish hook construction were born in Redditch, England, about the year 1560. Redditch was a likely location because it was an important needle manufacturing region, and the needle was the father of the modern hook.

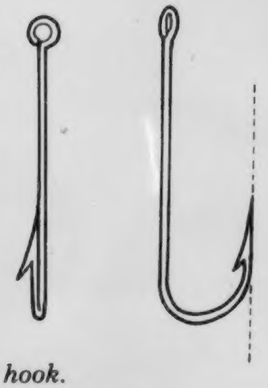
Foremost among the original hook makers was Charles Kirby, who in 1651 produced hooks using the same basic methods of tempering and hardening the metal that are used today. He developed the Kirby Pattern still used all over the world.

The firm of O. Mustad and Son was established in 1832 at Oslo, Norway, and became a world leader in the manufacture of fish hooks. Today, the Mustad Company markets more than 60,000 different types of fish hooks.

Until the early 1900s, fish hooks were mainly produced in Europe. During World War I, Americans improved metallurgy enough to take the guesswork out of making hooks. It was then that hook-making headquarters moved to the United States.



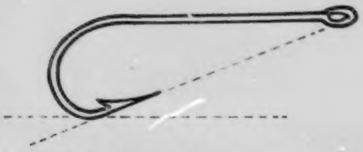
Early fish hooks.



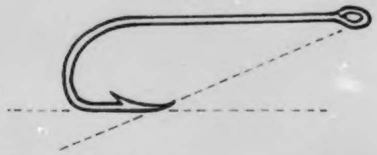
Kirby hook.

HOOK DESIGN

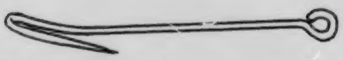
Correct hook design is as important as correct manufacture, and there are many designs suitable for



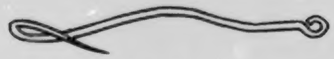
Pennell hook.



Eagle claw hook.



Offset hook.



Double offset hook.

various types of fish and for different angling methods. A book published in 1870 by English author H. C. Pennell noted that the four most important elements of hooks are penetration, holding power, strength, and lightness. The greatest penetrating power of a hook occurs when the line of penetration is parallel to the direction of the force applied. Pennell developed a hook to overcome shortcomings of other designs; however, he made the error of curving both the point and the bite of the hook inward, pointing to the eye. While this was correct in theory, in practice it resulted in inferior hooking power.

The problem was solved by two American craftsmen named S. M. Wright and A. D. McGill. Wright and McGill corrected the faults of the Pennell design by leaving the spear or bite parallel to the shank. They curved only the point inward, pointing it toward the eye in what they called an "Eagle Claw." Their design gave the hook far more penetrating and holding power. The Eagle Claw also has a mechanically hollowed point for quicker penetration. The barb is cut at an angle which bites less deeply into the wire, thus resulting in fewer broken barbs.

Since nearly 95 percent of hooks are used in bait-fishing, many Wright and McGill hooks are "kirbed" or offset in a novel way. The bend is double offset, half on either side of the shank, thus making the hook twist into the cartilage of a fish to further increase penetration and holding power. In addition, many are partially flattened or forged on the sides for extra strength. These hooks sparked a thriving business in Denver, Colorado, named the Wright and McGill Company, which is the exclusive manufacturer of the famous Eagle Claw hook. The company makes and sells well over a million hooks every day.

The Eagle Claw design does what an efficient hook should do — it puts the line of penetration in the direct line of pull, thus making it "hook and hold." This helps to eliminate short strikes and slightly-hooked fish.

Lines

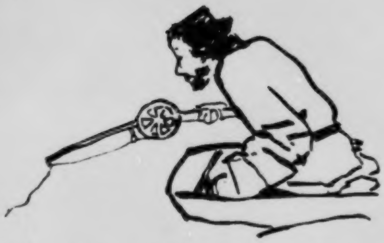
Once fishermen began using hooks, they improved their fishing lines. Animal gut, leather, vines, horsehair, and piano wire were used for lines. These worked for pole fishing, but a new line was needed when reels became popular. Braided cotton and silk was used until a single strong synthetic fiber known as monofilament was developed. Braided lines of Dacron and nylon are still favored by some modern fishermen.

Rods

Early fishing rods of bamboo, wood, and metal have evolved into today's solid fiberglass, hollow fiberglass, graphite, and mixtures of fiberglass and graphite rods. The development of various types of fishing rods paralleled the development of reels. As a reel developed, fishermen built a rod to function with that particular type of reel.

Reels

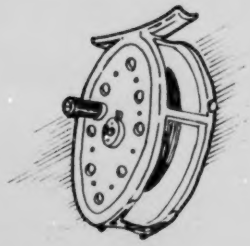
To catch more fish, early fishermen realized they needed to get their bait deeper and farther away, which spurred the development of the fishing reel. Probably the forerunner of all reels were the line holders first used on cane poles. They were simply two pegs or a notched board fastened to the lower end of the pole that was used to store extra line. The holders also helped in landing fish as well as storing line.



Drawing by Chinese artist Ma Yuan.

The idea that reels are only a product of modern technology, however, is unfounded. The first mention of fishing reels appears in **The Art of Angling** written by Thomas Barker in 1651, two years before **The Compleat Angler** by Sir Izaak Walton. In 1967, Dr. John T. Bonner displayed a painting by the celebrated Chinese artist Ma Yuan. The art work, which would have been painted during the period 1190-1230 A.D., showed a fishing reel being used.

While many believe that "cane pole" fishing, which does not employ a reel, was the only method used until recent times, fishing with reels actually has been popular with fishermen for hundreds of years. In more recent years, reels have been improved and perfected. From the various types of early reels, four main types of freshwater reels have evolved: *fly, bait-casting, spinning,* and *spin-casting* reels.



Fly reel.

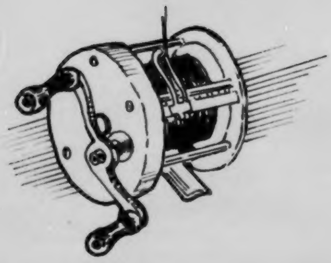
FLY REELS

Fly reels were developed primarily as a storage mechanism for unused line. The fly reel was used in combination with long, slender fly rods to cast delicate flies or other lightweight lures. While this equipment was fine for trout and panfish, some fishermen were interested in other species of fish that required live bait or heavy lures. Such interests prompted the development of the next oldest type of reel.

BAIT- OR PLUG-CASTING REELS

Early watchmakers, who made use of the principles involved in a winch, were credited with inventing the bait- or plug-casting reel. The early reels made by watchmakers usually were constructed of solid brass. Their smoothness and precision have been copied, but never equaled, in modern reels.

At one time people believed that the newer spinning reels would cause bait-casting reels to become obsolete, but just the opposite has happened. The bait-casting reel remains one of the most popular and is still considered by far the most accurate.



Bait-casting reel.

As a general rule, bait-casting equipment requires more skill to use than does spinning or spin-casting equipment; therefore, it is not recommended for teaching a beginning caster. It is difficult to use because the spool is free and turns as line is pulled from it. Pressure exerted by the thumb controls the speed at which the spool turns and also serves as a drag. If the spool turns faster than the line can come off of it, a backlash or bird's-nest occurs which can be discouraging and hard to untangle.

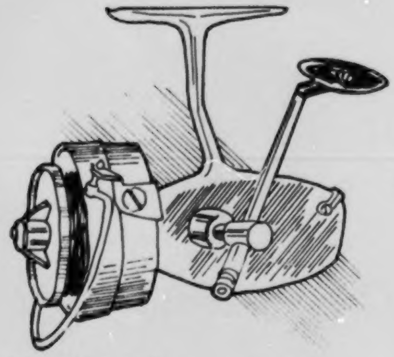
SPINNING REELS

About the time World War II was drawing to a close, a new fishing reel began to appear in the United States. The spinning reel was developed to overcome some of the shortcomings of the bait-casting reel.

Spinning reels are equipped with a fixed spool positioned on the underside of the rod. The concept of a fixed spool evolved from a method used in France of wrapping line around a wine bottle, then using a sidearm swing to allow the "bait" to pull the line off the bottle.

Since the spool does not turn during the cast, the problem of backlash is eliminated. The fixed spool also allows a longer cast because it eliminates most of the friction placed on the line by the spool.

Many fishermen, however, shied away from using the spinning reel, especially at first, because of its unusual appearance. Its flying pickup finger and oscillating spool were somewhat startling. Many referred to it as a "coffee grinder" or even a "pencil sharpener."



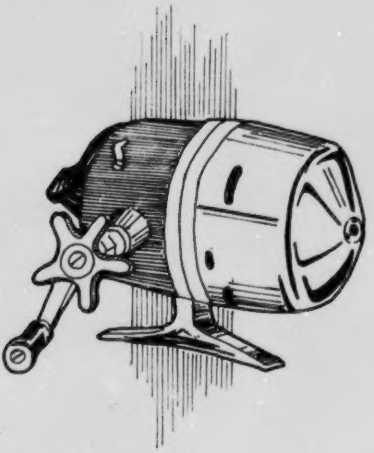
Spinning reel.

SPIN-CASTING REELS

The newest reel to be developed was the spin-cast or "pushbutton" reel. In theory, the spin-casting reel is the same as the spinning reel. Its spool remains stationary during a normal cast and retrieve while a rotating pickup mechanism revolves around the spool retrieving the line. The pickup lever is inactive during the cast. In the spin-casting reel, however, the spool, drag, and pickup mechanism are enclosed inside a nose cone or hood. The line flows off the edge of the spool inside the cover and passes out through a small opening in the front of the reel.

The spin-casting reel has been referred to as the product of a marriage between a bait-casting reel and a spinning reel. Mechanically it operates like a spinning reel, but it is mounted like a bait-casting reel and used on a bait-casting rod. Hand manipulations are almost the same as those used for bait-casting except the thumb pushes a button or lever that controls the line rather than pushing on the line itself. There are hundreds of different spin-casting reels and no two of them are exactly alike. Some resemble the spinning reel, while others resemble bait-casting reels. All have one thing in common — the spool and pickup mechanism are either fully or partially enclosed.

Of the four types of reels, the spin-casting is the simplest to operate, is relatively inexpensive, and is excellent for teaching beginners how to cast.



Spin-casting reel.

SUMMARY

Casting equipment, like equipment in other sports, plays an important role in the overall success of its user. Fishermen need a good working knowledge of their equipment if they are to get the most efficient use from it and maintain it in top working condition. Nothing can be more frustrating than to lose a good fish because equipment malfunctioned or to spend valuable fishing time trying to repair equipment. Fishermen also need to know what type of equipment would best suit their needs.

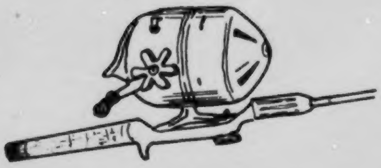
With these things in mind, the remainder of this module will be directed toward basic freshwater casting equipment and will cover types of equipment and the functions, advantages and disadvantages, and maintenance of each.

Freshwater Casting Equipment

Freshwater casting equipment is available in many different types, but certain basic components — rod, reel, and line — are common to each. These three parts must work together, or be balanced, for casting to be efficient. The term "balanced" refers to the relationship between different components as they combine to perform a specific task.

Balanced Casting Equipment

A relationship exists between rod and reel, reel and line, rod and lure, lure and line, and rod and line. These relationships need to be understood in order to purchase equipment that is balanced.



Large reel, small rod.

ROD AND REEL RELATIONSHIP

The rod and reel relationship is simple. You don't put a large reel on a small, light rod or a small reel on a large, heavy rod. The drag system on a small reel is made for the bend of a small rod and vice versa.

REEL AND LINE RELATIONSHIP

The relationship between reel and line is a functional one. Using heavy line on a small, light reel will create problems. The small spool allows the heavy line, which is relatively stiff, to spring off at the first sign of slack causing the reel to malfunction. Also, a small spool can only hold a small amount of heavy line, which makes it impractical for fishing.

To use light line on a heavy reel, the reel drag must be set at its minimum and still the line may break, so this combination is not recommended either.

ROD AND LURE RELATIONSHIP

The relationship of rod and lure varies from person to person. While one person may be able to cast a ¼-ounce lure using a particular rod, another person may require a different rod. For each rod there is a specific range of weight lures that performs best for an individual.

When a cast is made with the correct weight lure, the rod will bend until it reaches its peak load which enables the entire rod to work for its user. When a lure too heavy for the rod is used, the tip of the rod will straighten out and no longer be of any help. In other words, a 6-foot rod with too heavy of a lure will only cast like a 4½- to 5-foot rod. Another problem with a lure that is too heavy for the rod is that after the lure is cast the unused rod tip snaps forward and actually pulls back on the lure.

A lure that is too light for a rod does not bend the rod enough to use all of its built-in power. A fisherman ends up doing all the work in this case without the help of the rod.

In fly-fishing the weight of the line carries the lure instead of the lure carrying the line, so fly rods require certain weight lines to function efficiently. Manufacturers usually mark the recommended line weight on the fly rod. A line too light for the rod does not use the rod efficiently, and a fisherman works harder. A line too heavy for the rod causes the tip section to straighten out and is not of help to its user.

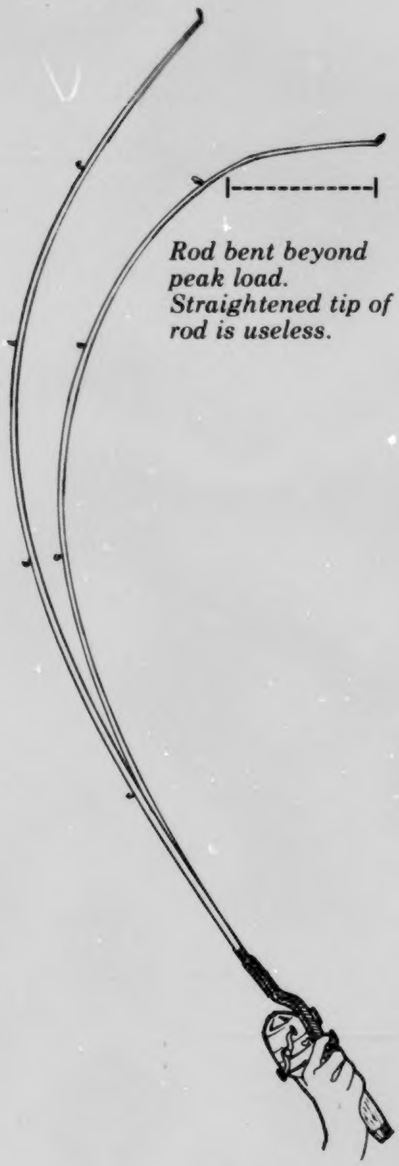
LURE AND LINE RELATIONSHIP

While the relationship of lure and line is not really important to the fly fisherman, it is extremely important to the bait-caster, spin-caster, and spinning fisherman because the weight of the lure pulls the line from the reel. Several forces act on the lure and line during a cast — friction between the rod guides and the line, wind resistance, and gravity. All of the forces are lessened by using a light line instead of a heavy line; however, a heavy lure on a light line may create so much stress on the line during the cast that the line breaks. Also, a heavy lure has large hooks that require a heavier line to set the hooks.

Selecting the right line for any weight lure is a compromise. The lighter the line, the farther you can cast. On the other hand, the lighter the line, the more likely it is to break. As a general rule, spinning and spin-cast fishermen use a 4-pound-test line with ⅛-ounce lures; 6-pound-test line with ¼- to ⅜-ounce lures; 8-pound-test line with ½- to ⅝-ounce lures; 10-pound-test line with ¾- to 1-ounce lures; and 12-pound-test line with 1½- to 2-ounce lures. While these same specifications also work well with bait-casting equipment, bait-casters usually prefer a slightly heavier line to compensate for the added resistance of the revolving spool. By adding two pounds to each of the line specifications given for spinning and spin-casting, you have the ideal line lure specifications generally recommended for bait-casters.

The type of water being fished also dictates the best line to use. Weedy, brushy water calls for a heavier line

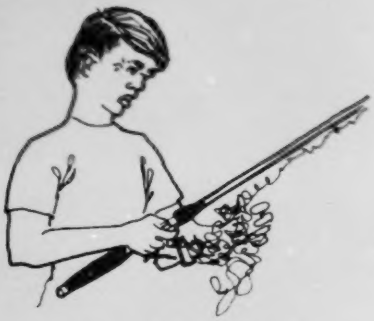
Rod bent to peak load.



Rod bent beyond peak load. Straightened tip of rod is useless.

Lure	*Test Line*
⅛ ounce	*4 pound*
¼-⅜ ounce	*6 pound*
½-⅝ ounce	*8 pound*
¾-1 ounce	*10 pound*
1½-2 ounce	*12 pound*

Recommended for spinning and spin-casting. For bait-casting, add 2 pounds to line specifications.



Oops — line too heavy for the lure.

than open water.

Open-face spinning reels offer an additional problem when it comes to the lure and line relationship. A heavy line used with a light lure will continue to spring off the open-face spool as the lure slows down and stops. This can lead to a lot of headaches and is why a beginning spinning fisherman should stick with lighter lines until some level of proficiency is acquired.

ROD AND LINE RELATIONSHIP

Every rod has a range of pound test lines that will function with it. Within that range is an ideal pound test line. For general fishing a medium action rod is best because it has the widest range of pound test lines that can be used effectively with it.

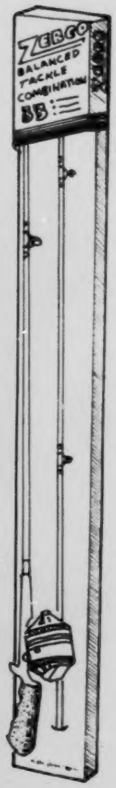
When a light lure and light line are used on a heavy rod, the rod does not bend during the cast. This creates considerable stress at the tip of the rod and frequently causes the line to break. A heavy lure on a light line will bend a heavy rod somewhat, but again, the stress created would in turn be too much for the light line.

A rod is made to pull only so much. For example, an ultra-light rod is capable of pulling three pounds with its recoil power. If you use a 12-pound-test line with this rod you have an extra nine pounds of line strength that's merely excess baggage. A little extra line strength is good insurance, but heavier line means shorter casts. Your intended use should help you make the decision of what line weight to use.

Hopefully, fishing is not all casting, and occasionally you'll hook a fish and have to play it. For this the rod and line relationship plays another important role. Because a rod bends it absorbs the shock of sudden dashes or runs made by a fighting fish, but a line too light to bend the rod will break. A line should be able to bend the rod thoroughly before breaking. A good rule of thumb is to select a line heavy enough to withstand your strongest casts, then add a few extra pounds for insurance and you have the proper strength of line for your fishing rod.

Balanced tackle is an important key to successful fishing. Remember when selecting your fishing equipment that balanced tackle is a combination of rod, reel, line, and lure that when used together produce the best results.

Some manufacturers have made it easier to select balanced tackle by producing kits that have rod, reel, and line in proper balance. All the buyer has to do is select the kit that would work best with the type of lure or bait to be used.



Balanced casting outfit.

Fishing Rods

Fishing rods come in various lengths, weights, actions, and designs, but all rods have certain common features that determine their quality.

The purpose of a fishing rod is to work with the muscles of the arm to propel a weight and to control a hooked fish. The rod does this by bending and the recoil power propels the weight; therefore, the rod's stiffness, weight, and action are important features. Stiffness and weight are controlled for the most part by the material used to build the rod, while the action is determined by the rod's construction.

MATERIALS

Modern rods are made from solid fiberglass, tubular fiberglass, graphite, mixtures of fiberglass and graphite, bamboo, and boron. While other materials are used occasionally, these are the most common and the most practical.

Solid fiberglass is inexpensive, strong, and easy to maintain. Its main disadvantage is its weight. A solid fiberglass rod can wear a fisherman's arm out in a hurry.

Tubular fiberglass, the most common material used in rods today, has all the advantages of solid fiberglass without being heavy. It requires more care, however, because it is more easily broken. Tubular fiberglass is slightly more expensive than solid fiberglass.

A new material, carbon graphite, was developed just a few years ago. Graphite is stronger, lighter, and more sensitive than fiberglass. Many tournament bass fishermen have switched to this rod because its lightness allows them to cast more without undue fatigue. The sensitivity of the rod also makes it great for the soft strikes that can't be felt when using a fiberglass rod. Its sensitivity has made it popular with fly fishermen who claim that a graphite fly rod will allow them to actually feel a wet fly drift across the rocky bottom of a stream.

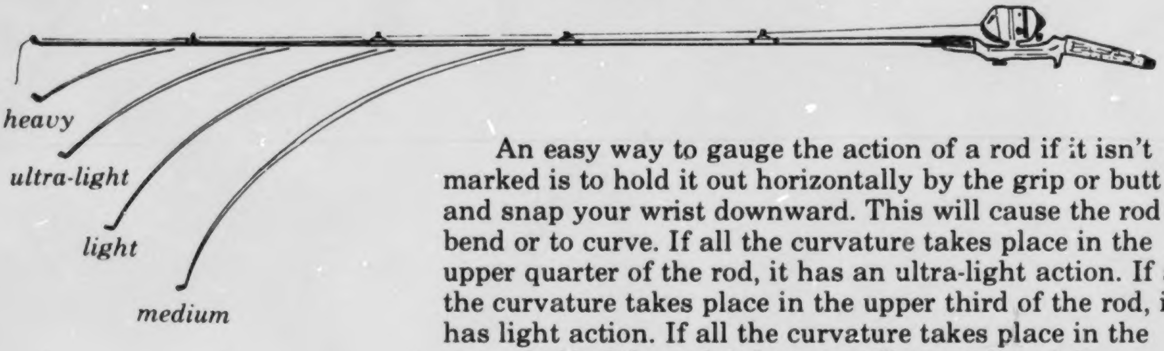
Unfortunately, the advantages of graphite have been overshadowed by one major disadvantage — cost. A graphite rod will cost two or three times more than a tubular fiberglass rod of similar quality. Manufacturers are now mixing graphite and glass in an effort to reduce the cost factor. The lower percentage of graphite decreases the cost without apparently hurting the quality, although this depends on the amount of graphite used. The process is new, but if it works as is expected, these rods may become the most popular.

The latest rod material to be marketed is boron, which has been credited with being more sensitive, stronger, and lighter than graphite. Cost, however, is once again a limiting factor.

ACTIONS

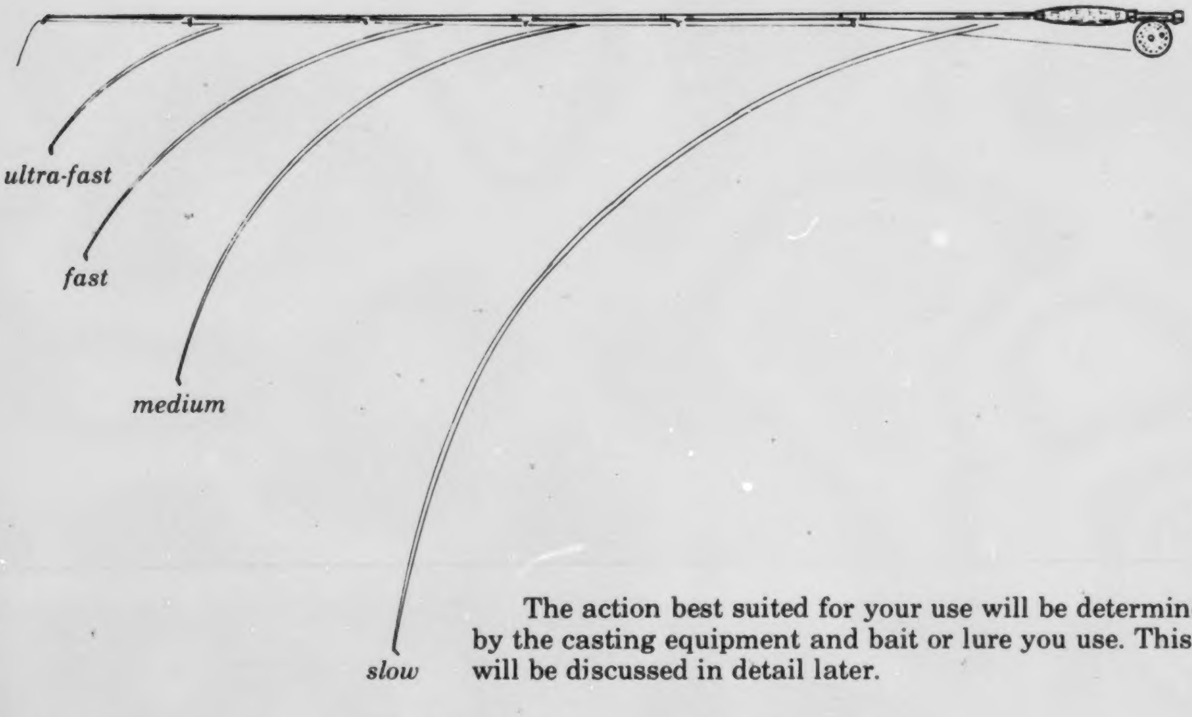
The action of a rod is described as the shape it assumes when exposed to stress. Some manufacturers use the term "power" instead of action. Action has nothing to do with the weight of the rod or the weight of the lure the rod casts.

Although manufacturers have used many different terms to label the various action types, four general terms are most commonly used for bait-casting, spinning, and spin-casting rods — *ultra-light, light, medium,* and *heavy* or "worm" action. A rod's action is usually gauged when it is a blank, and once the grip and guides are added the action usually will change slightly.

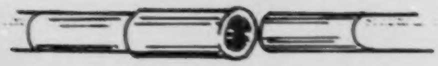


An easy way to gauge the action of a rod if it isn't marked is to hold it out horizontally by the grip or butt end and snap your wrist downward. This will cause the rod to bend or to curve. If all the curvature takes place in the upper quarter of the rod, it has an ultra-light action. If all the curvature takes place in the upper third of the rod, it has light action. If all the curvature takes place in the upper half of the rod, it has a medium action. A heavy or "worm" action is a very stiff rod with only a slight bend in the upper 10 to 20 percent of the rod.

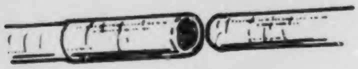
Fly rod actions are usually labeled with different terms than those used for other casting rods. The terms used to describe fly rod actions are *ultra-fast, fast, medium,* and *slow*. Ultra-fast action is the same as ultra-light action. Fast action is the same as light action. Medium action is the same in both fly- and plug-casting rods. However, slow action, sometimes referred to as parabolic, is quite different from heavy or "worm" action. Slow action in fly rods is when the rod assumes a progressive curvature from the butt or grip all the way to the tip of the rod.



The action best suited for your use will be determined by the casting equipment and bait or lure you use. This will be discussed in detail later.



Metal ferrules.



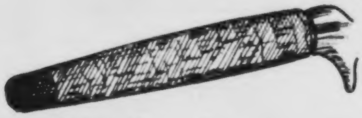
Fiberglass ferrules.

FERRULES

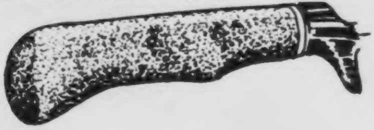
Another feature used to determine quality in a rod is its ferrules, which are the connecting devices used in two- or three-piece rods. Metal ferrules that rely on a friction fit are still the most common and with proper care they work quite well! Their main advantage is they are inexpensive. Their disadvantages are that they will rust and wear and they are not flexible, thus causing a stiff spot in the rod's action. Mini-ferrules, which are shorter, help solve some of the stiffness problem.

Also available are fiberglass ferrules. These ferrules do not rust and rely on a taper fit instead of friction, so wear is not a problem. Fiberglass ferrules are slightly flexible and therefore do not affect the rod action as much as metal ones. They also are easier to separate. Their main disadvantage is that they cost more than metal ferrules.

Another type of ferrule that is gaining popularity, particularly with graphite rods, is the self-material ferrule, which is made from the same material as the rod. These ferrules have the same advantages as the fiberglass ferrules and they are more flexible. Rods with detachable grips have a specialized ferrule called a butt ferrule that fastens the grip to the rod. Most rods today do not have detachable grips.

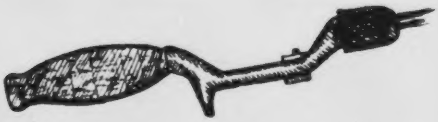


Cork and rubber grips.

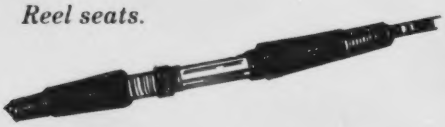


HANDLES OR GRIPS

Until a few years ago handles were almost always made of cork. Today, however, rubber grips are becoming more and more popular because rubber is more durable and feels better in the hand. The shape of the grip is important for accuracy in casting. Shape, which varies depending on the type of equipment, will be covered in detail later.

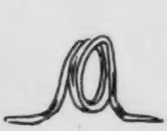


Reel seats.

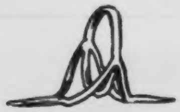


REEL SEATS

The part of the handle that holds the reel on the rod is called the reel seat. Reel seats usually are made of metal, although some companies have manufactured plastic ones. Metal reel seats still are considered the best even though they are heavier. Plastic ones are less durable and more easily broken. The most popular types employ either a lock screw system or a lock ring system. Better quality rods use double locking rings. These vary depending on the type of equipment, but both serve their purpose well.



Bridge guide.

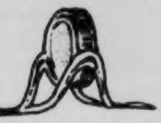


Ring guide.

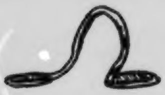
GUIDES

Guides control the line during a cast by keeping it horizontal to the rod. They also distribute evenly the stress on the rod when line pressure is applied to bend the rod.

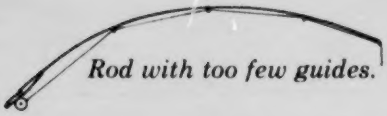
Many types and shapes of guides have been developed over the years. The four most commonly found in freshwater tackle are the bridge guide, ring guide, ceramic insert guide, and snake guide. Each of the four types work well and usually are associated with one of the four categories of casting equipment. The bridge guide is used



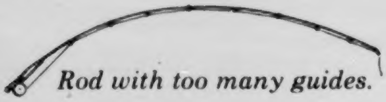
Ceramic insert guide.



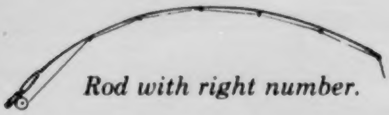
Snake guide.



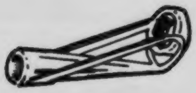
Rod with too few guides.



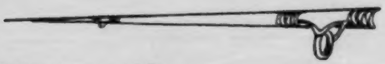
Rod with too many guides.



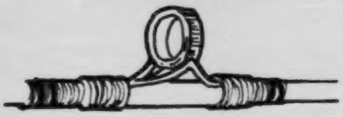
Rod with right number.



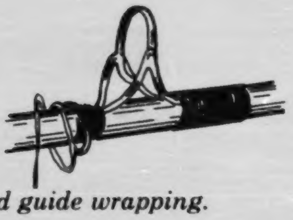
Tip-top guide.



Stripping guide.



Guide wrapping.



Frayed guide wrapping.

most on spinning rods; the ring guide on spin-casting or bait-casting rods; the ceramic insert ring guide on better quality bait-casting rods and spinning rods; and the snake guide on fly rods.

The number of guides found on a rod is important. Too few guides will cause the line to sag and slap the rod during the cast, creating friction that shortens the distance of the cast. Too few guides also prevent an even distribution of stress on the rod when line pressure bends it.

Too many guides increase the friction on the line as it passes through the guides. They also create stiff spots, which can completely change a rod's action.

No hard and fast rule on how many guides to put on a rod has ever been established. The number varies depending on use and personal preference. Cheaper rods of lesser quality tend to have fewer guides. When purchasing a rod, a good rule of thumb is one guide for every foot. In other words, a 6½-foot rod that has four guides will not perform as well as a rod that has five or six.

The material that guides are made from is important because the friction of fishing line can wear grooves in soft metal guides that will then wear out or weaken line. The most commonly used material for guides is chrome-plated stainless steel because it has proven to be effective over long periods of use.

Ceramic insert guides are gaining popularity because they outwear metal guides and create less friction. Although they are more expensive in the initial cost of a rod, in the long run they are cheaper.

The rod tip guide, or tip-top guide, is a specialized guide that is fastened to the tip of the rod. This guide receives the most wear on a bait-casting, spinning, or spin-casting rod, so it has to be made from a hard material. Ceramic insert guides are best, while tungsten carbide are a good second choice. In fly-fishing the lowest guide on the rod, called the stripping guide, receives the most wear and must be made from a hard material. Again, ceramic insert or tungsten carbide guides are the best.

Guides become smaller from the grip to the tip of the rod. This serves to gradually reduce the slack line coils without affecting the flight of the bait or lure. Guides are fastened to the rod by wrapping them usually with nylon thread that is then covered with several coats of polyurethane for protection. A new innovation replacing wrapping is a solid nylon sleeve which holds guides in place and does not fray or wear out.

BASIC CARE AND STORAGE

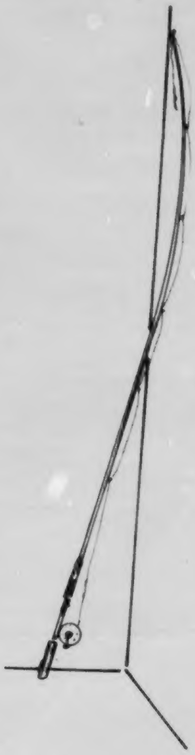
A quality rod will last many years if it is given proper care. Rods should be kept clean by wiping them with a damp cloth. Make sure that guides are clean and free of rust and grooves, and if rust or grooves do develop, then replace the damaged guides. New guides are much cheaper than a new rod. In the module on Making and Repairing Equipment, instruction on how to replace guides will be discussed.

Rod handles should be kept cleaned of the fish slime and mud that builds up on them. Rubber handles can be cleaned easily with soap and water. Cork handles need to be scrubbed in soapy water with steel wool or a scrub pad.

Windings on guides wear and become frayed. When this happens, a few new coats of polyurethane or other protective coating will restore them. Metal ferrules and reel seats should be cleaned and kept free of rust, but do not use oil on them for it attracts dust.

Rods should be stored by hanging them vertically. Rods that are stored horizontally or leaned against something may develop permanent bends or sets in them. They also should be kept away from extreme heat. Avoid storing rods in the trunk of a car for a long period of time. A quality rod is an investment that deserves proper care at all times.

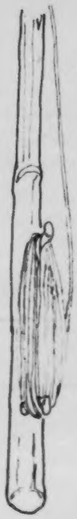
Don't lean rods against walls.



Fishing Reels

A reel of any kind is actually little more than a winch. Its primary function is to store line, which gives a fisherman a means of controlling his line while fishing. Reels also act as a counterweight to balance the weight of the rod. This makes the casting process fluid and graceful.

To cast a lure or bait efficiently, a reel is an absolute necessity in all methods of fishing except fly fishing. As the cast is made, line unwinds from a spool and is later rewound onto the spool by turning the reel handle.

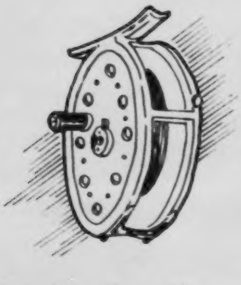


Early line holder.

Most quality reels have a drag system built into them. The drag is an adjustable tension control that prevents a strong fish from breaking the line or the rod. The drag should be set according to the weight of line being used.

To set a drag, first locate the drag adjustment and then loosen it until you can easily pull line from the reel without releasing the spool or bail. Now gradually tighten the drag until you reach the desired tension. Most quality reels have drag adjustments where they are readily accessible and can be adjusted while playing a fish. This, however, is tricky business and a good way to lose a fish when your line breaks. It's better to set the drag before you make your first cast and then leave it alone if possible. Drags should be loosened after fishing to avoid compressing the tension springs.

There are four basic types of freshwater reels: fly, bait-casting, spinning, and spin-casting.



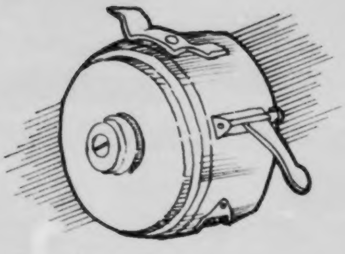
Single-action fly reel.

FLY REELS

A fly reel's main function is to store line. Two basic types of fly reels are popular today — the single-action reel and the automatic reel. With a single-action reel, the reel handle must be turned manually to retrieve line. Most quality single-action fly reels can be adjusted so the reel handle is on either the right or left side.

Line is retrieved on an automatic reel by simply tripping the trigger which releases a tension spring that revolves the reel spool and swiftly rewinds the line. The spring system in the automatic reel is similar in principle to the spring system used in the old wheellock muzzle-loading firearms.

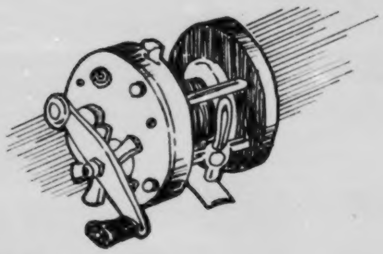
The single-action reel is the most popular because it is less expensive and is easier to control. Automatic reels are heavier than single-action reels, which makes them harder to balance to a rod, and since they have more moving parts, more can go wrong with them.



Automatic fly reel.

BAIT-CASTING REELS

Bait-casting reels, sometimes referred to as level-wind reels, are available in a variety of designs, sizes, and price ranges. All bait-casting reels mount on top of a rod handle and have a revolving spool. Spool tension is controlled during the cast by the thumb, which makes it harder to learn how to use this type of reel but greatly increases the reel's accuracy potential.

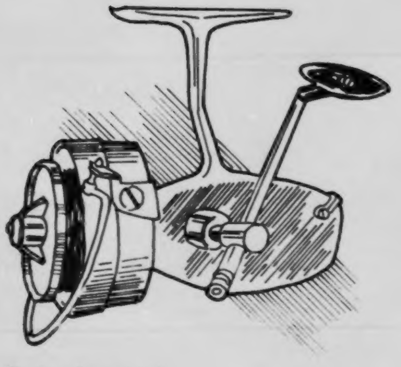


Bait-casting reel.

SPINNING REELS

The spinning reel is sometimes called an open-face reel because its line and spool are exposed at the front of the reel. The spool on a spinning reel does not turn, but remains stationary on both the cast and the retrieve. Line is pulled from the spool by the weight of the lure and rewound by turning a bail. This type of reel creates little friction during casts so it is noted for its distance and it also can use very light lines.

Spinning reels are mounted underneath the rod and are available in various designs, sizes, and quality. They also are available in both right- and left-hand models, or models with interchangeable handles.

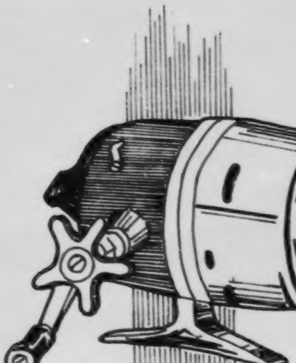


Spinning reel.

SPIN-CASTING REELS

Spin-casting reels are sometimes called closed-face spinning reels because they have a hood or nose cone that covers the line and stationary spool. These reels have a lever or button operated by the thumb that releases line from the spool for casting. The thumb and wrist action used in casting a spin-casting reel is similar to that used in casting a bait-casting reel.

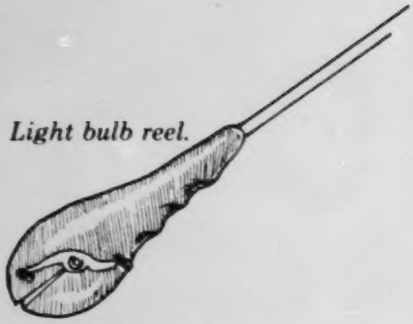
Spin-casting reels are designed chiefly to be mounted on the top of a bait-casting or spin-casting rod, but occasionally they are mounted under the rod. As with other reels, they come in different designs, sizes, and qualities. The spin-casting reel, however, is the most versatile of all the reels and the easiest to cast, which explains why it is the most popular type of reel used today.



Spin-casting reel.

SPECIAL REELS

Occasionally a special reel is produced that doesn't fit



Light bulb reel.

into any of the four basic reel categories, such as the reel made to work both as a spin-casting reel and a fly-casting reel. Specialty reels generally combine one or more features of the basic reels.

SELECTION AND CARE

When choosing a reel, an important feature to consider is the reel's *gear ratio.* Gear ratio refers to how many revolutions of line will be wound onto the spool by each turn of the handle. For example, with one ratio one turn may retrieve two feet of line while with another ratio one turn may retrieve only one foot of line. Most quality reels will have a gear ratio of at least 3.5:1, which means that with each turn of the handle line is wound onto the reel 3½ times. If you plan to fish lures that require a fast retrieve, reels with a 5:1 ratio are the best.

Like rods, reels come in different sizes to help maintain balance. Several companies now offer ultra-light reels, light reels, medium, and heavy action reels. The reel size to be used is determined by the size and action of the rod.

A reel will last for many seasons, but only if it is cared for properly. Line should be checked and changed regularly. Fortunately, most reels are easy to disassemble and clean, which is important to do because dirt on the fishing line accumulates inside the reel as the line is retrieved. After cleaning, reels should be lubricated with lightweight oil according to the manufacturer's instructions.

Fishing Lines

Fishing around brush and rock.

Next to the hook itself, fishing line is often considered the most important fishing equipment. All fishing lines have their own specific characteristics. As mentioned in the discussion on balanced equipment, line should be matched to its intended use.

CHARACTERISTICS

1. *Stretch* is an important characteristic in lines because it serves as a shock absorber. The line stretch and drag setting on a reel also helps prevent the line from breaking.

Stretch qualities of particular lines are controlled by the manufacturers, and it is important to know how much your line will stretch so you can set your drag accordingly. An important point to remember is that the more line you have cast, the more stretch that line has. This is why a long cast with stretchy line makes it difficult to set the hook on a strike.

2. *Abrasion resistance* is another characteristic of a quality line that helps it to retain its original strength. Lines are made to resist abrasion as much as possible. Fishing around rocks, logs, and other obstructions can weaken line, just as a lot of casting can weaken the line, especially the last three feet or so as it passes through the

guides. When fishing, periodically check your line for abrasions by letting the line slide through your fingers as you retrieve it. You also should pull on the lure occasionally to test the end of the line and the knot.

A nick in a line will weaken it.

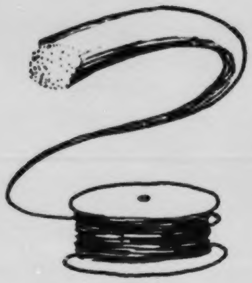
3. *Knot strength* is another important line characteristic. Each type of line will react differently to various knots and splices; therefore, knots should be chosen carefully to retain the original line strength. Remember, the weakest part of any fishing line is the knot. Knots will be covered in detail later.

4. *Impact resistance* is an important characteristic to consider when selecting the size of line best suited for the fishing you will be doing. Impact resistance is measured by two common classification systems — *test line and class line.*

Most of our modern fishing line is marketed as *test line.* For example, 8-pound-test line, which is a common test line, means the manufacturer guarantees that the line, when wet, will not break below the 8-pound-test stated on the spool. Another method of classifying line is by *class line,* which is produced primarily by Europeans. Class line is guaranteed to break as near as possible to the stated class line strength, but not at or above it.

5. One other important characteristic of fishing line is its *rigidity.* Most braided lines are limp, but monofilament lines vary. As a rule, the heavier a line, the stiffer it is. Some manufacturers are producing a limp monofilament line which works on some reels that don't function well with stiff, springy line.

TYPES OF LINE



Monofilament line.

1. *Monofilament line* is the most popular fishing line used today because it is the most versatile line available. It can be used on most reels, and the widest range of knots can be used with it.

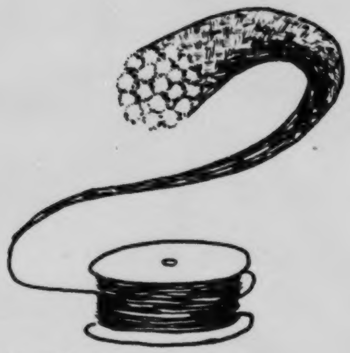
Monofilament line, which consists of a single strand of nylon, is available in a wide range of colors, types, and weights (from less than 2- to over 200-pound-test). Some of the new highly visible colors make it best for such forms of fishing as trolling.

While monofilament line varies in terms of strength, diameter, knot strength, impact resistance, stretch, abrasion resistance, and rigidity, the best lines will test just above their stated weight when wet to keep the line diameter small and other characteristics consistent. A small diameter helps increase casting distance, depth penetration, minimum visibility, and provides maximum line storage on a reel.

A small diameter line is best for maximum casting distance.

Monofilament lines vary not only in their chemical properties, but also in their physical ones. Economy grades are not as strong or as uniform as premium grades.

Lines come in 100-yard spools, filler spools of 200 or more yards, and large bulk spools. Usually it is cheaper to buy the large bulk spools which will fill several reels, but



Braided line.

surplus line should always be stored in a cool, dark place. Heat and light have a deteriorating effect on monofilament.

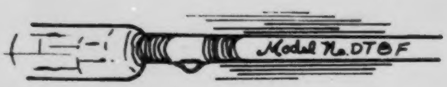
2. *Braided line* is a soft, flexible line that lies well on a reel spool. Its use in freshwater fishing is usually restricted to cane poles and bait-casting equipment. Braided lines are made of nylon or Dacron. Dacron is stiffer and has little stretch. Dacron line, used in trolling and big game fishing, doesn't work well when knotted, so it usually needs to be spliced.

Braided nylon comes in both hard and soft line. Since the hard line resists water and wears better, it is preferred by most fishermen. The soft line lies on a reel spool better, so tournament casters prefer it for accuracy. Braided nylon also is a good choice for smooth casting with bait-casting reels. Both braided nylon and Dacron lines come in weights from 4- to 160-pound test.

Weight, not strength, is important with fly lines.

3. *Fly lines* are completely different from monofilament and braided lines which are used with cane poles, spin-cast and spinning reels. The weight, not strength, is important with fly lines.

To work efficiently, a fly line weight must be matched to a fly rod. Most quality fly rods are marked with the proper weight of fly line that should be used. Manufacturers use the numbers 1 to 14 to classify fly lines, with 1 being the lightest line. The number usually is preceded by a lettering system to describe the line's qualities — (L) for level, (DT) for double taper, and (WF) for weight forward. Another letter system is designated after the number — (F) for floating, (S) for sinking, and (F/S) for floating line-sinking tip. An example is *DT8F*, which means the fly line is a double tapered line with a weight classification of 8 and the line is a floating line.



Most fly rods are marked with the proper line size for the rod.

Most modern fly lines are constructed by coating a braided line with plastic. The thickness of the plastic is varied to achieve the desired taper. Level lines are the least expensive, but tapered lines are needed for delicate presentation of some flies. Weight forward lines, good for distance, are used with bass bugs and other larger flies. Fly fishermen have experimented for years with different tapers and weights. Lines such as the long belly rocket tapers were developed to combine distance with a delicate presentation.

Fly lines are available in both floating and sinking lines.

Most fly lines are available in both floating and sinking lines. Sinking lines are classified as slow, medium, and fast sinking, with a special extra-fast sinking model. These varieties enable a fisherman to fish flies at different water levels and to cope with varying water conditions. Floating fly lines generally are easier to cast. Some companies offer floating lines with sinking tips that will sink from 10 to 30 feet, which allows a fisherman to select different depths according to the water conditions.

Most fly lines are sold in lengths of 90 to 115 feet. To increase length, most fly fishermen use a 20- to 30-pound test braided Dacron line as a backing line. Braided Dacron winds on and off a reel more smoothly than monofilament line.

Fly lines require *leaders* to prevent fish from seeing the heavy fly line. In some forms of fishing, leaders made of metal are used to prevent fish with teeth from biting through the line. Fly line leaders are usually the length of the rod, or 7 to 9 feet. Most fly fishermen use a tapered leader of monofilament line. The butt section of these leaders may be 10-pound-test and taper down to a 2-pound-test tippet. Some fishermen join several weights and diameters of monofilament line to obtain a tapered leader.

CARE AND STORAGE

Always take proper care of your fishing line. Fly lines should be cleaned periodically with a damp cloth. If you plan to use a fly line next season, it's better to remove the line from the reel for winter storage. The line should be stored in large coils to prevent it from developing twists.

Store monofilament line in a cool, dark place.

Monofilament line should be stored in a cool, dark place because heat and light will weaken the line. For this reason it's not a good idea particularly in the summertime to leave fishing reels in the back of a car or truck or locked in the trunk. Monofilament line also needs to be checked periodically for abrasions. Most fishermen remove all line from reels for long-term storage. Purchasing new line each season is a good investment and helps prevent problems.

All fishing lines should be kept away from gasoline, insect repellent, and suntan lotions for they also can weaken the lines. Remember, even a good quality rod, reel, and hook are useless without good fishing line.

Knots

The weakest part of any fishing line is the knot.

Moisten knots before pulling them tight.

The weakest part of any fishing line is the knot. All lines have particular knots that function best for their use. While there have been numerous books written on knots, most freshwater fishermen can get by quite well with a working knowledge of a few proven knots.

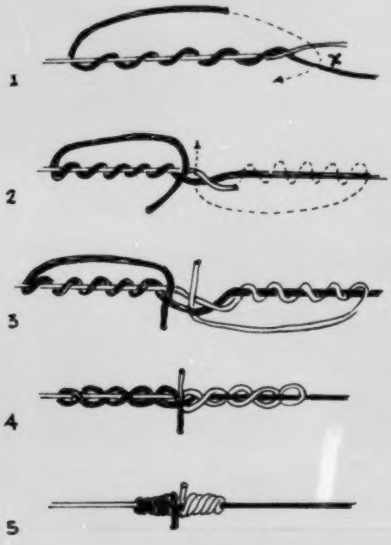
Knot tying is a skill as important to fishing as the skill of casting, and it should be practiced to gain proficiency. A good way to practice tying knots is to use braided nylon cord or cotton clothesline, which is heavier and easier to work with than monofilament line. Practice hooks can be fashioned from coat hangers. After learning to tie knots with the larger cord, begin practicing with monofilament line that is about 15-pound-test and gradually work down to lightweight monofilament lines.

When tying knots with monofilament line, it's important to remember that heat weakens the line. The friction created by rapidly pulling a knot tight can create enough heat to weaken it. Experienced fishermen have learned to wet a loose knot by putting it in their mouth or in the water and then slowly pulling the knot tight. While this may take a few more seconds, it is worth the time.

Knots can be classified into three groups — line-to-line knots, line-to-leader knots, and line-to-lure knots. Knowing one or two knots in each group should be adequate for most people.

Line-to-Line Knots

Basic Blood Knot



BASIC BLOOD KNOT

Use: This knot can be used for tying a line to a backing line or any time two lines need to be joined. Trotline fishermen use this knot to connect two trotlines. When tied properly, the basic blood knot retains almost 100 percent of the line strength.

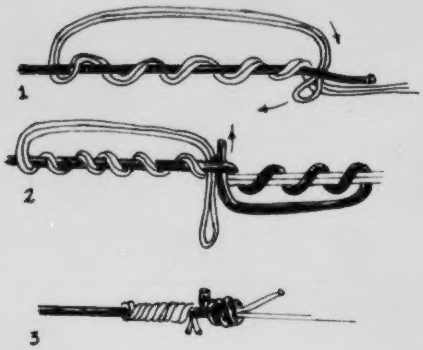
How to tie a Basic Blood Knot:

(1) Start by lapping the two pieces to be joined so the ends above the crossing are a good five inches long; hold them between the right thumb and forefinger. Twist the leftward-pointing end around the other strand five times and place the end between the strands at point X, holding it there. (2) Transfer the knot to the left thumb and forefinger and wind the other end around the other strand five turns in the opposite direction. Pass the end through the knot beside the other end, but in the opposite direction from it. (3) The knot now can be released and should look as shown. (4) Pull on both strands of line, but be careful that the ends don't pull out. The knot will gather as shown. (5) Now pull the knot as tight as possible and clip the ends. It should look like the drawing at left.

If you need to join a light line to a heavy line, you can increase the strength by using a Double-Strand Blood

Knot. This is tied in the same manner as the Basic Blood Knot except that the end of the lighter line is doubled. When tying, the double end is used as if it were a single.

Double Strand Blood Knot



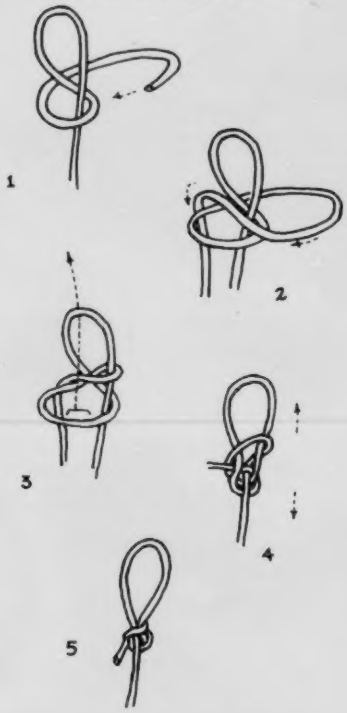
PERFECTION LOOP KNOT

Use: This knot is used to make a loop at the end of a line. Some fishermen use it to fasten artificial lures to their line because they believe the loop gives the lure more movement or action.

How to tie a Perfection Loop Knot:

(1) Hold the end of the line between your left thumb and forefinger so that about six inches of it extends upward. Holding the end with your right thumb and forefinger, throw a small loop to the left so it crosses behind the standing end. (2) Hold this loop between your thumb and forefinger; bring the end toward you and pass it around the loop, clockwise, also grasping this between your left thumb and forefinger. (3) You now are holding two loops, the second one in front of the first. Pass the short end of the line between the two loops, also holding it between your left thumb and forefinger. Now grasp the front loop and work it through the rear loop, at the same time pulling it out a little. (4) Holding it tightly so the knot won't slip, pull on the lower extension of the line, thus closing the smaller loop. (5) If the remaining loop starts to twist, keep it from twisting and pull down on the lower end and up on the remaining loop until the knot is tight. Then use a pen, pencil, or similar object to pull the loop as tight as possible. Clip off the short end of the line.

Perfection Loop Knot



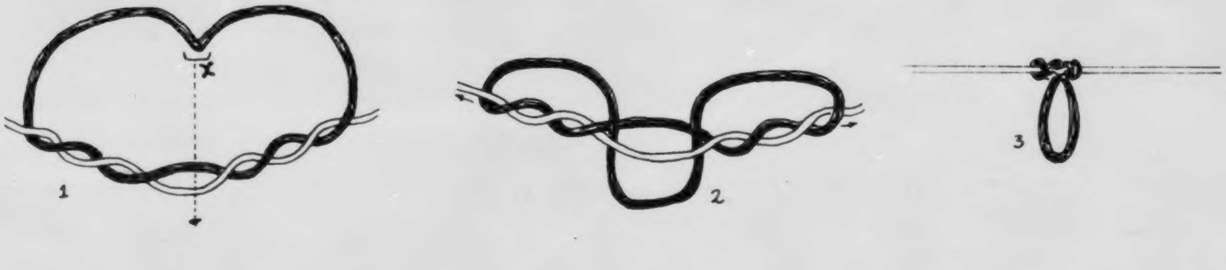
DROPPER LOOP KNOT

Use: This knot is used to make a loop in a line somewhere other than the end. It is used by trotliners to fasten drops to the main line and also is used when fishing multiple baits from one line.

How to tie a Dropper Loop Knot:

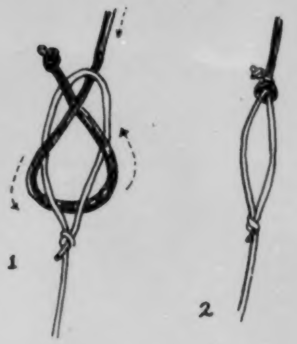
(1) Make a loop in the line or leader and wrap the end overhand seven to nine times through the loop. Pinch a small loop at the point marked X (as shown at left) and push it between the middle of the turns, as shown by the arrow. A pencil or pen, inserted in the middle turn, helps to keep the strands separated so this can be done easily.
(2) Pull on both ends of the line, holding the loop with the third finger. (3) The Dropper Loop will gather and look like the finished knot shown at left.

Dropper Loop Knot



Leader-to-Line Knots

Jam Knot



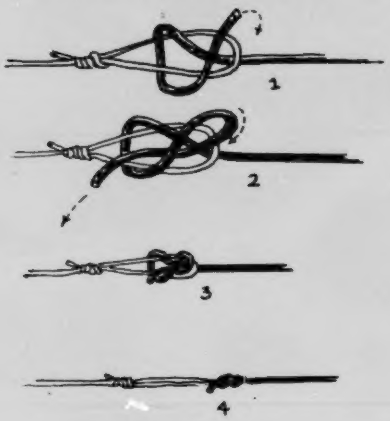
JAM KNOT

Use: This knot is a quick and easy way to attach a looped-end leader to an unlooped line. It is a rough knot and therefore doesn't slide through rod guides well, which makes it unattractive to most fly fishermen. It is popular, however, with bait fishermen who use snelled hooks (hooks with leaders attached) because the short leader on a snelled hook has a loop on it making it ideal for this knot. The heavier the line, the easier the knot is to untie.

How to tie a Jam Knot:

(1) Tie an overhand knot in one end of the line; then pass the end through the leader loop, completely around it, under the line itself and back through the loop between the leader and the line where it enters the loop. (2) Work the knot tight, not cutting the excess end too closely.

Tucked Sheet Bend Knot



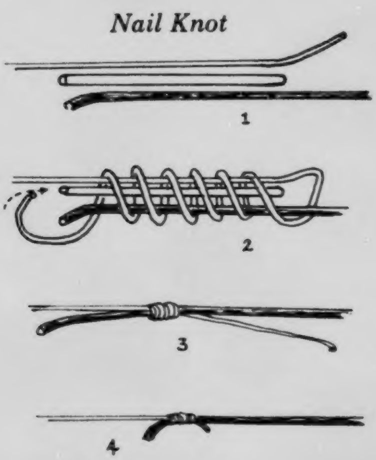
TUCKED SHEET BEND KNOT

Use: The Tucked Sheet Bend serves the same purpose as the Jam Knot, but it is a neater knot that slides through rod guides better.

How to tie a Tucked Sheet Bend Knot:

(1) Pass the end of the line through the leader loop and around it. (2) Bring the end back between the line and the loop and down through the crossing that was made in the line. (3) This is a simple figure "8". (4) Be sure that the leader loop doesn't slip over the line before the knot is pulled tight.

Nail Knot



NAIL KNOT

Use: This knot was devised to replace the time-consuming job of splicing backing or leaders to fly line. A nail was used until fly fishermen discovered that a small, hollow, plastic or metal tube worked better than a nail. Many people use a ball inflation needle.

How to tie a Nail Knot:

(1) Pull out at least six inches of backing or leader and lay the tube against it. Then lay the end of the fly line beside the tube facing the opposite direction. (2) Hold the three between your left thumb and forefinger. Now take the protruding end of the backing in the right hand and wrap it tightly five to seven times back toward your left thumb and forefinger. Holding these coils so they won't overlap, bring the end of the backing to the left and push it through the tube to the right. (3) Still holding the coils tightly, carefully pull out the tube, pulling the backing out as much as possible at the same time. With the tube pulled out, the coils will appear soft, but don't let go of them. Pull the backing from both ends alternately, as shown, allowing thumb and forefinger to let the coils gather. When no more backing can be pulled from either end, let go of the coils and adjust them if necessary. Then pull hard again on both ends of backing to make the coils bite into the line. (If using pliers, grasp the end of the line you'll be trimming to prevent damaging the other line.) (4) To be sure the knot is

tight, pull cautiously at first, then hard, on the fly line and backing. If the knot has gathered tightly, the fly line won't slip and further pulling will tighten it more. Clip off excess ends. A recommended way to strengthen this knot is to apply a drop of cement, such as *Super Glue,* to the knot. It's a good idea to read the label on the glue to make sure it can be used on plastic.

Line-to-Lure Knots

IMPROVED CLINCH KNOT

The most commonly used knots in fishing are the line-to-lure or hook knots, of which the Improved Clinch Knot is the most common. This knot is so basic to fishing that it is often referred to as the Fisherman's Knot.

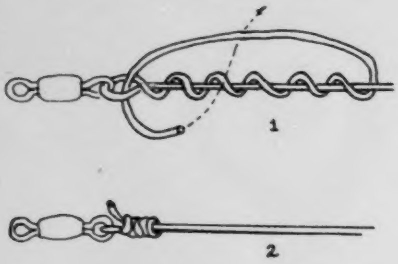
Use: The Improved Clinch Knot is used for tying lines or leaders to hooks or lures with straight eyes, and for attaching swivels. This knot is dependable, easy, and retains nearly 100 percent of the line strength.

How to tie an Improved Clinch Knot:

(1) Stick the end of the line through the eye and make five "S" twists around the line. Push the end through the first loop nearest the eye and then back through the big loop. (2) Holding the hook or swivel and the line, pull the knot tight until it looks like the knot shown at left. Trim the end closely. When using this knot on lines of 60-pound-test or heavier, three or four twists are sufficient.

The regular Clinch Knot is the same as the Improved Clinch Knot except that the end of the line is not passed back through the big loop. The Improved Clinch Knot is more popular because it is stronger.

Improved Clinch Knot



LOOSE LOOP CLINCH KNOT

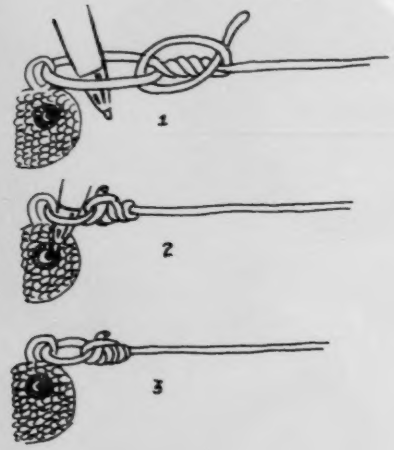
A variation of the Improved Clinch Knot is the Loose Loop Clinch Knot.

Use: This knot is used to make a loose connection to a lure to give it more action.

How to tie a Loose Loop Clinch Knot:

(1) Tie an Improved Clinch Knot, but do not draw it tight. (2) Insert a pen or pencil into the loop and tighten the knot. (3) Pull out the pen and trim the excess line. While this knot should not slip during casting, it may when a fish is hooked. This should not be a problem, however, since the knot reverts to an Improved Clinch Knot.

Loose Loop Clinch Knot



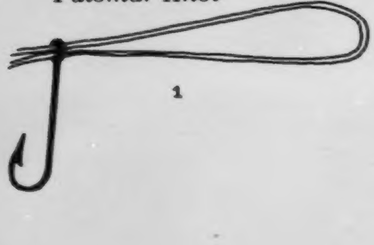
PALOMAR KNOT

Use: This is another quick, easy knot used for fastening hooks, lures, and swivels which also provides nearly 100 percent of the line strength.

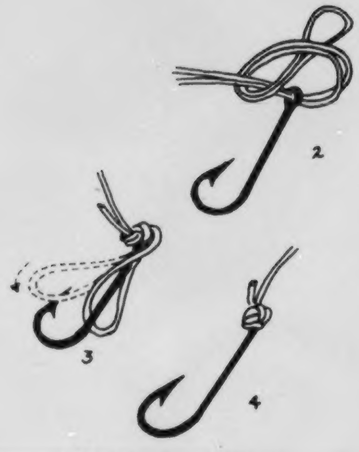
How to tie a Palomar Knot:

(1) Thread the line through the eye, then return it through the eye to make a loop three or four inches long. (2) Holding the line and eye between your thumb and forefinger, use your other hand to bring the loop back over

Palomar Knot



the doubled line, making an overhand knot around the eye. (3) without tightening the knot, place the loop over the hook or whatever is being tied. (4) Pull on the line to draw the knot to the top of the eye. Pull either the line or the end of the knot to tighten the knot; trim the excess.



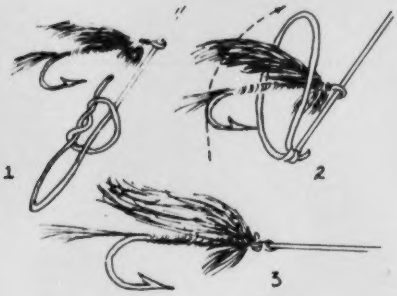
Double Turle Knot

DOUBLE TURLE KNOT

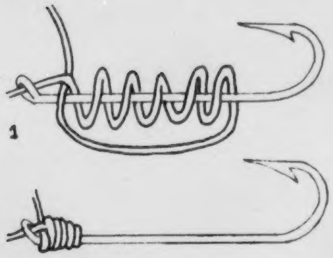
Use: Even though this knot has only about 60 percent of the line strength, it has been successfully used by fly fishermen for years.

How to tie a Double Turle Knot:

(1) String the fly on the leader and let it slide down, out of the way for the moment. Double the end of the line or leader and make a noose or slip knot in it, but put the end through the knot twice. (2) Pull the knot tight and open the noose or slip knot enough so the fly can be passed through it. (3) Holding the noose in one hand, raise the leader so the fly slides down it into the noose. Gather the noose around the neck of the fly at the back of the fly's eye. The knot should be set against the back of the downturned eye to give the leader a direct line of pull to tighten the knot.



Quick Snell Knot



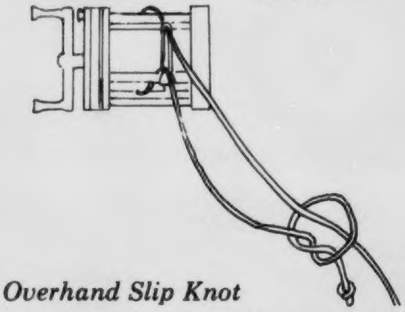
QUICK SNELL KNOT

Use: To snell a hook is to tie a snell knot on the shank of the hook below the eye. This insures that the line of force is parallel to the line of hook penetration, which gives better penetration and holding power. Hook manufacturers market snelled hooks, but many fishermen find it less expensive to snell their own. There are several ways to snell a hook, but a quick, easy way is the Quick Snell Knot. This knot works best with 10-pound-test line or heavier.

How to tie a Quick Snell Knot:

(1) Run the line through the eye of the hook, then wind it around the shank five to seven times. (2) Push the line under the first twist, just back of the hook's eye, between the line and the hook shank. Pull the material tight from the line end and clip off excess line. You may need to push the twists toward the eye as you pull the knot tight so they stay together.

Line-to-Reel-Spool Knots



Overhand Slip Knot

OVERHAND SLIP KNOT

Use: Many beginning fishermen have problems finding a good knot to fasten line to a reel spool. While there are several good knots that can be used, a popular one is the Overhand Slip Knot.

How to tie an Overhand Slip Knot:

Run the line around the spool and tie an overhand knot at the end of the line. Pull it tight and trim off any excess. Now tie a second overhand knot around the line going into the reel spool. Pull the second overhand knot tight while working it close to the first one. This forms a noose that shouldn't pull out. Pull on the line to run the knot snugly down to the reel spool. This knot should be tied opposite the direction that the spool turns to prevent it from slipping on the spool. Some spools have a hole through them to prevent line from slipping on the spool.

Selecting Freshwater Equipment

Freshwater Equipment
1. *Cane pole*
2. *Fly-casting*
3. *Bait-casting*
4. *Spinning*
5. *Spin-casting*

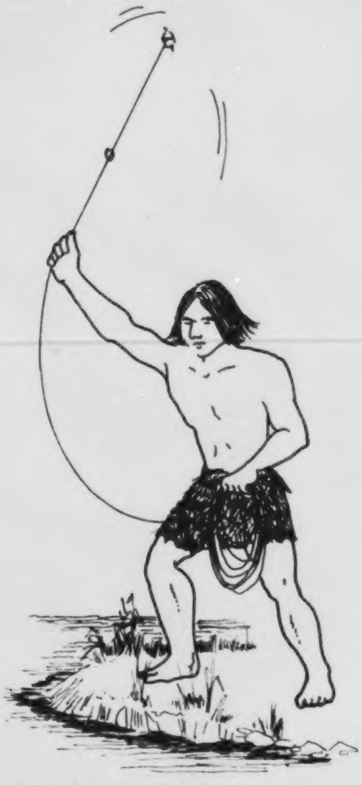
Up to this point, casting equipment has been discussed in terms of rods, reels, and lines. The remainder of the information on equipment will focus on the five basic types of freshwater equipment — (1) cane pole, (2) fly-casting, (3) bait-casting, (4) spinning, and (5) spin-casting. The characteristics, care, advantages, and disadvantages of each will be discussed.

What equipment to use is determined by the type of fish you want to catch, water conditions, and the bait or lure you plan to use. In many cases more than one type of equipment will meet your needs. In such cases, personal preference usually determines the type of equipment used.

Once you know the type of equipment you prefer, it is important to select the proper size for your intended use. In this case, the type of fish you want to catch will determine the bait or lure you should use. The bait or lure will then determine the type and size of equipment you need.

Fishermen who are "purists" often specialize in one particular species of fish, which allows them to choose a rod, reel, and line that are matched precisely for their use. Most fishermen in Missouri, however, are more versatile. They may fish primarily for one or two species, but on occasion they want to fish for different species and use several different methods. They want their equipment to be more versatile, if only for economical reasons.

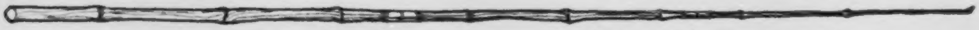
When selecting equipment, you should avoid buying cheap equipment. Bargains are great, but always check the quality. Usually you get what you pay for. Paying a little more in the beginning usually will save you money in the end. This also applies to equipment for young children, for many times they are given casting outfits that are only toys. Such equipment is hard to use, causes problems, and can even discourage a youngster from wanting to fish. Young fishermen should be entitled to the same quality equipment as adults.



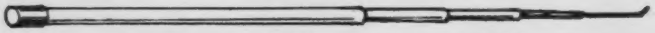
Early fishing equipment.

Cane Poles

The first type of casting equipment used consisted of a coil of line, a weight, and a hook. A fisherman casted his line much like a cowboy throws his rope. Casting was easy, but playing the fish could wear out the arm before the fish. This problem was solved by fastening the line to the end of a long, slender, flexible pole. Now the pole could absorb the force of the fighting fish and provide more leverage in playing the fish. The concept of the cane pole had been born. The name cane pole was derived from Calcutta cane, which was and still is a good material for poles. This type of equipment also is called a bank pole.



Three-piece cane pole.



Telescoping cane pole.

POLES

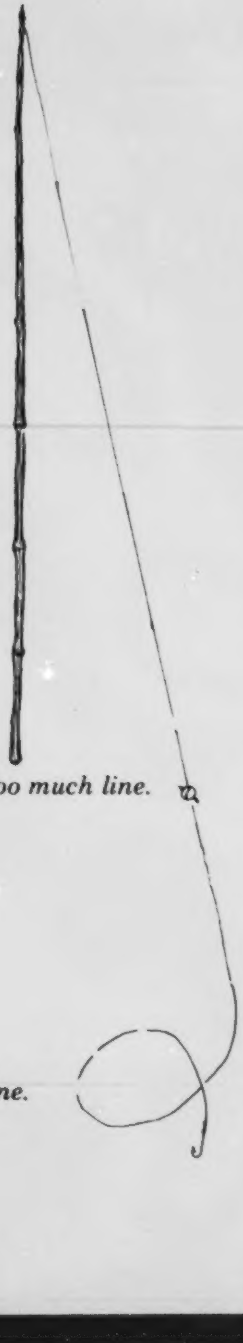
The most distinguishing characteristic of cane pole equipment is the absence of a reel. Cane poles are usually 8 to 20 feet long and made from Calcutta cane, fiberglass, metal, or bamboo. Some poles are one piece while others are two or three pieces which makes them easier to transport. Some companies make a fiberglass telescopic pole which has become popular. A cane pole can be a simple, bare pole or have such accessories as a tip-top guide, cork handles, and a built-in place to wrap extra line when not in use. Strength, flexibility, and length are the most important characteristics to consider when selecting a cane pole.

LINE

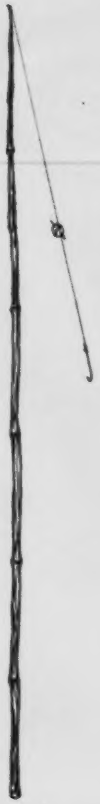
The line used with cane poles is usually a braided nylon or Dacron that is fastened near the end of the pole and threaded through the tip-top guide if the pole has one. The line should *not* be tied directly to the end of the pole; instead, it should be tied at least eight inches from the end because the tip of the pole is the weakest part and more apt to break.

The weight of the line should be matched to the pole. A heavy line on a light pole may break the pole if too much stress is applied by a heavy fish. Line is cheaper than a pole to replace.

Novices sometimes make the mistake of using too little or too much line. A good rule of thumb is never to have your line shorter than the length of the pole or longer than the combined length of the pole and your arm. A line that's too short limits how far and how deep you can fish your bait. It also creates more stress on the pole when playing a fish. A line that's too long is awkward to cast and can make landing a fish a real problem. Cane polers who use too long a line have only three choices in landing a large fish: (1) They can rotate the pole and wind the line onto it, but this is slow and awkward. (2) They can grab the line and pull the fish in hand over hand, but this can be painful on hands. (3) Or, they can turn and run madly away from the water, scaling or skinning the fish as they drag it onto the bank. Such methods are not recommended and can be avoided by using the proper amount of line.



Too much line.



Not enough line.

Landing a fish the hard way.

USE

The cane pole can be used to fish almost any type of natural or artificial bait; however, its most common use is to fish live bait. Any fish that will strike live bait can be caught on a cane pole, but panfish, catfish, bass, carp, drum, and buffalo are most commonly fished. Although it is uncommon, some people still use a cane pole to cast flies, which is not surprising since this type of equipment was the forerunner of modern fly rods. Today's fly rods, however, do a much better job than cane poles.

Bass fishermen discovered that big bass often seek shade during the heat of the afternoon under brush piles, boat docks, and duck blinds where it's difficult to cast lures or bait. A smart old fisherman learned that the best way to fish for these bass is to use a cane pole. By tying a piece of monofilament line, 3 to 5 feet long, to the cane pole and fastening the bait or lure, it's possible to run the pole under the water and any obstructions to reach the shady, secluded spot. This method, sometimes called "duddle socking," has been successful and, surprisingly enough, is growing in popularity.

CARE

Maintenance of a cane pole is simple, but important. With metal or fiberglass poles, only the line needs attention. It should be inspected for weak spots before using and should be stored by *loosely* wrapping it around the rod. The line will become kinky and snarled if it is wrapped tightly around the pole. Cane and bamboo poles can be varnished or shellacked periodically to prolong their life. They should be stored horizontally to prevent a permanent bend from developing and weakening the pole.

ADVANTAGES AND DISADVANTAGES

Advantages of a cane pole are obvious — it is simple, inexpensive, and easy to use. It can be used in special situations such as brushy shorelines where conventional casting equipment won't work as well.

It is difficult, however, to land fish without a reel and drag system. Cane poles also limit the distance you can fish from the shore or a boat. One-piece cane poles are hard to transport. In addition, cane poles limit a fisherman to live or natural baits since most artificial lures are hard to use effectively with a cane pole.

Fly-Casting Equipment

RODS

Fly rod.

Next to cane poles, fly rods are usually the longest rods used in fishing. Fly rods come in different lengths, actions, weights, and powers that are usually designated on the rod. Tackle should be selected according to the type of fishing you will be doing the most.

Rod Power or "System"	Kind of Fishing	Rod Length	Blank Rod Weight	Fly Line Size (First Choice)
4 Extra light	Trout — small streams, tiny flies, fine leaders. Panfish — sheltered ponds, tiny bugs, small flies.	7 ft.	3 oz.	DT-4-F
5 Very light	Trout — small streams, delicate casting, smooth water Panfish — ponds and small streams, tiny bugs, small flies.	7½ ft.	3¼ oz.	DT-5-F
6 Light	Trout — medium size streams and ponds, larger flies. Panfish — bass-sheltered waters, small bugs and flies.	8 ft.	3½ oz.	DT-6-F
7 Medium light	Trout — medium size streams and ponds, all flies. Panfish — bass-sheltered waters, small bugs and flies.	8½ ft.	4 oz.	DT-7-F
8 Medium	Trout — large streams and lakes, all wet and dry flies, streamers. Panfish — large streams and lakes, all panfish flies and bugs. Bass, pike — open water, all flies, small bugs.	8½ ft.	4⅝ oz.	DT-8-F DT-8-F WF-8-F
9 Medium powerful	Bass, pike — large water, all flies.	9 ft.	5 oz.	WF-9-F(BBT)

REELS

A fly line should be matched to the rod and to complete the fly-casting outfit, a reel must be selected. Whether you prefer a single action or an automatic reel, the reel must feel comfortable on the rod, which again relates to balanced tackle. The size and weight of the reel must be matched to the rod. The type of fishing you plan to do will determine how much line you need for casting and playing the fish. A good quality fly-fishing outfit can amount to a sizable investment, but with proper care it can provide many years of trouble-free fishing.

CARE

Care should be taken when storing and transporting fly rods not to damage the guides or the rod itself. Rods should not be stored wet. Metal or plastic tube cases are a wise investment to protect your rods.

Metal storage tube.

Fly reels should be cleaned and lubricated at least once a year, more often if they receive heavy use. Check the manufacturer's instructions for how to disassemble and lubricate your reel.

Care of fly lines and leaders also is important. The older silk fly lines had to be dried and stored in loose loops to prevent the line from twisting, but modern plastic lines can be stored on reels the year around. If line twist does occur, you only need to stretch the line to remove the twist.

In replacing fly line, the first step is to determine if backing is necessary. On light equipment for smaller fish, backing isn't necessary. On heavier tackle for larger fish, the backing line provides a safety against long runs while playing the fish. A good backing is a soft, braided nylon or Dacron line of about 20-pound-test. The amount of backing you need depends on the fish you want to catch. A five-pound or larger fish may require at least 50 yards of backing to be safe. Since most Missouri fly-fishing is done for fish under five pounds, less backing is required.

Backing should be tied to the fly reel spool using an overhand slip knot. After the backing is wound onto the spool, the fly line is tied to it with a Nail Knot. The leader is then attached to the fly line by using a good line-to-leader knot such as the Tucked Sheet Bend or Nail Knot, or a device like the Eagle Claw "leader link." Several other types of connectors are available at sporting goods stores.

When the backing, fly line, and leader are on the reel, a good practice is to tie the leader to something solid such as a small tree, then back up and unwind the leader and fly line, stopping at the backing. The line should then be stretched to remove any kinks and test the knots before carefully rewinding it onto the reel spool.

ADVANTAGES AND DISADVANTAGES

Fly-fishing allows fishermen to cast a very light bait or lure. Playing a fish on a fly-casting outfit is done without the aid of a reel or winch-type system since most of it is done by hand. Many fishermen feel this requires more skill and results in more action and self-satisfaction. Casting a fly line usually is more difficult to master, but once you have, few things can match the satisfaction of feeling a line shoot through the guides on a perfect cast.

Some disadvantages of fly-fishing have been mentioned. It is a harder skill for most people to master and requires more practice. Wind also has more effect on fly-casting than it does on other methods, for strong winds can make the sport all but impossible for the not-so-skilled fisherman. Since fly-fishing requires open space for long back casts, brushy fishing areas are hard to fish by this method. Fly-fishing probably requires the most specialized of all casting equipment. Within its ranks are some of the most ardent "purists" found in fishing.

Bait-Casting Equipment

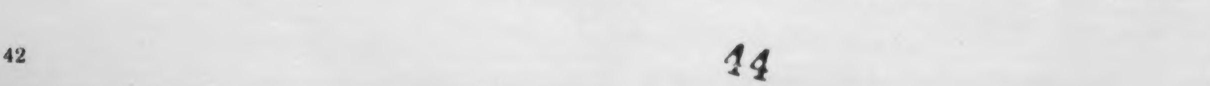
Use of bait-casting equipment took a sharp decline after spinning equipment came on the market; however, with the recent improvements in this type of reel, it is becoming popular again.

Bait-casting equipment is available in various sizes and strengths. Your choice depends on the size of bait or lure you plan to use and the structural hazards of the water you'll be fishing. The following chart should help you choose a bait-casting outfit.

Rod Action	Kind of Fishing	Rod Length	No. of Guides on Rod	Reel	Weight of Lures or Bait	Line
Ultra light	Small bass & panfish in fairly open water.	4½-5½ ft.	5-6	ultra light	⅛ - ⅜ oz.	4-8 lb.
Light	Medium sized bass, walleye in fairly open water, also small fish in weedy water.	5½-6 ft.	5-6	light	⅜ - ½ oz.	8-15 lb.
Medium	Versatile outfit for large bass or muskellunge; excellent for bait fishing & trolling.	5½-6½ ft.	4-6	all purpose	½ - ⅝ oz.	15-18 lb.
Heavy rod with fast action	Walleye, large bass, muskellunge, freshwater trolling.	5½-6 ft.	4-6	all purpose	⅝ - ¾ oz.	15-20 lb.
Heavy rod with medium action	Large freshwater fish.	4½-5½ ft.	4-6	heavy duty	¾ - 1½ oz.	15-30 lb.

RODS

Bait-casting rods are usually the shortest rods. Most are made from tubular fiberglass, graphite, or a combination of both. Generally they are a medium action with offset handles. Better quality bait-casting rods have ceramic insert guides that help eliminate some of the friction on the line. This is important because the bait-casting reel, with its revolving spool, creates more friction than other reels.



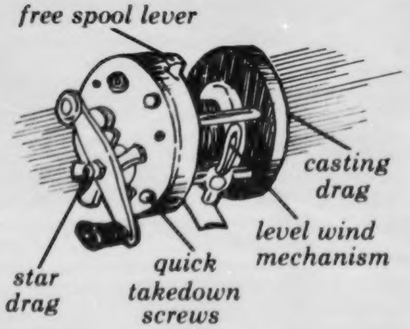
Bait-casting rod.

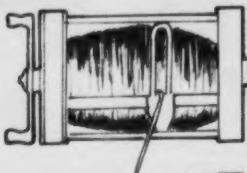
REELS

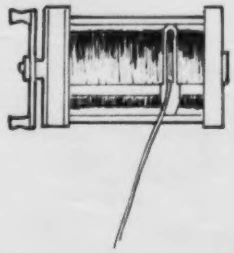
Bait-casting reels have progressed a long way from the early brass reels made by watchmakers. The first bait-casting reels were often called "knuckle busters" because the reel handle would spin as the line unwound during a cast.

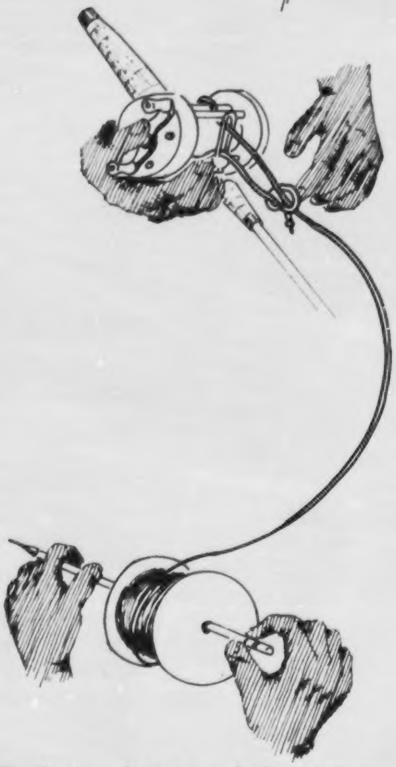
Today's quality bait-casting reels have a level wind

Bait-Casting Reel




Uneven spool.


Even spool.


Replacing line on a bait-casting reel.

mechanism, adjustable casting drag, star drag systems, quick takedown screws, free spool lever, and a high gear ratio. The level wind mechanism ensures that the line is wound evenly back onto the spool. The adjustable casting drag allows a fisherman to set the spool tension to match the weight of his lure, which helps eliminate backlash. Star drag systems provide a means of quickly setting the drag and adjusting it while playing a fish. Quick takedown screws make the reel easier to clean and lubricate. The free spool lever disengages the spool from the handle for casting purposes, which helps eliminate friction on the spool. A high gear ratio allows fishermen to retrieve more line with fewer turns of the handle. This helps when playing a fish and in achieving the proper action in some lures that require a fast retrieve.

CARE

Since bait-casting reels generate more friction than fly reels, lubrication is especially important. Always lubricate reels according to manufacturer's specifications.

Heavier lines generally are used with bait-casting equipment. Soft or limp monofilament is preferred by many fishermen, but monofilament requires more careful thumbing when casting. The best type of line for a beginning bait-caster is a braided line because it requires less precise thumbing and results in fewer backlashes. A backlash with a braided line also is much easier to untangle.

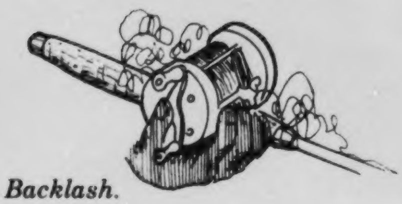
Even experts have an occasional backlash. With a little patience, a backlash can be untangled by starting at the heart of the snarl and carefully working the loops away from the center to open it. Tugging on a backlash only complicates the problem. After the snarl is opened, the loop or loops causing the problem can be located and easily pulled out. Once this is accomplished, the snarl will fall apart and the loose line can be rewound.

When replacing line on a bait-casting reel, a pencil, dowel rod, screwdriver, or similar object is inserted through the line's plastic spool and held by another person. The end of the line is threaded through the level, wound, then tied to the bait-casting spool with an overhand slip knot. The line from the plastic filler spool should be coming off the top of the spool.

While one person holds the filler spool, another turns the reel handle. To ensure that line goes on the reel snuggly, thumb pressure should be kept on the filler spool. It is important to fill the reel spool completely. The crack between the edge of the spool and the side plates should not be visible when the reel spool is full. Line needs to be larger than the crack or it may become tangled in the internal gears. If the line winds unevenly onto the reel spool, chances are the level wind needs to be adjusted, which should be done according to the manufacturer's directions.

ADVANTAGES AND DISADVANTAGES

A primary advantage of bait-casting equipment is the extreme accuracy that can be achieved using it. This type of equipment has produced some amazing scores in casting tournaments over the years. Its accuracy is most helpful to a structure fisherman who is casting at a very small target area. This equipment also allows the use of heavy baits and line. With it fishermen are able to fish in water filled with obstacles. Bait-casting reels are popular with people who use artificial lures because they will function with the jerky or uneven retrieves that are necessary to get the proper action from some of these lures.


Backlash.

Potential backlash is a disadvantage with this equipment, but practice and patience can overcome this obstacle. Bait-casting equipment, however, does require more skill on the caster's part than spin-casting equipment. Because the revolving spool creates more friction, casts are shorter using this equipment. The added friction also prevents the use of light lures and baits.

Price is another disadvantage. Since bait-casting reels are a more complicated piece of equipment, they usually cost more and require more service. Even with its disadvantages, however, bait-casting equipment is becoming more popular.

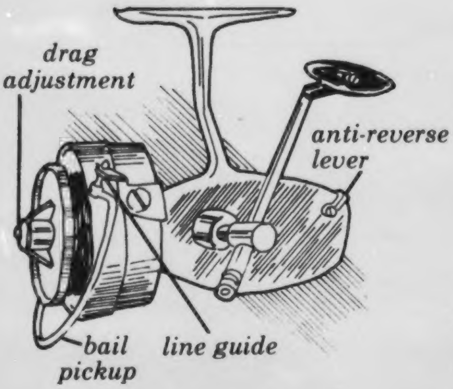
Spinning Equipment

RODS

Spinning rods are usually longer than bait- or spin-casting rods and have larger guides to help eliminate friction. The lowest guide on the rod, referred to as a "gathering guide," is especially large to reduce line coils as the line comes off the spool.

Spinning rod.

Spinning Reel



REELS

Spinning reels, like fly reels, attach to the underside of the rod and most have a left-hand retrieve. Reels usually come with a 3.5:1 to 5:1 gear ratio, which means 3½ to 5 revolutions of the pickup for each turn of the reel handle. The higher gear ratio gives more lure control and allows a faster retrieve.

Spinning equipment, like other types of casting equipment, comes in all sizes and strengths. Again, the choice depends on the size of the bait or lure you plan to use and the structural hazards you'll encounter where you fish. These factors should determine the size of rod, reel, and line you purchase. The following table is general and may vary from individual to individual.

43

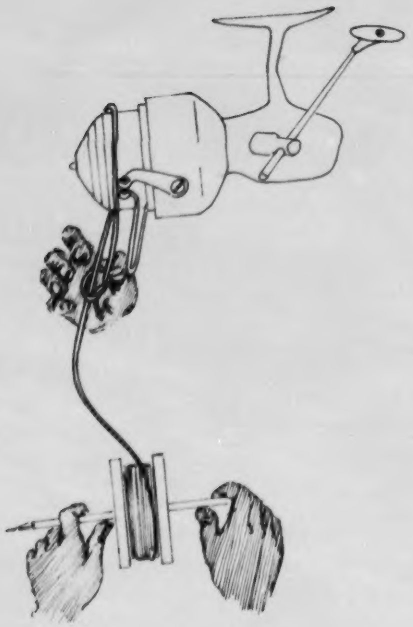
Reel	Line Test	Lure Weight	Rod Length	No. of Guides on Rod
Ultra light	2-4 lbs.	1/32 - ⅛ oz.	5½ - 6 ft.	5-6
Light	4-8 lbs.	⅛ - ¼ oz.	6½ ft.	5-6
Medium	6-10 lbs.	¼ - ⅜ oz.	6½ - 7 ft.	6-7
Heavy	10-15 lbs.	½ - 1½ oz.	7½ ft.	6-7
Extra heavy	15-20 lbs.	2 - 4 oz.	8 ft.	6-8

Features to look for in a good quality spinning reel are an anti-reverse lever, brake or drag, and line pickup devices. An anti-reverse lever prevents the reel from backwinding when a heavy lure is used or when a fish is applying pressure. It is also handy when casting because sometimes the lure is reeled in too close to the rod tip. When this happens, instead of having to release the bail, you only need to switch off the anti-reverse lever and let out some line; then switch on the lever and you're ready to cast. The anti-revese lever is almost a necessity when the reel is used for trolling.

Drag adjustments usually are found on the front of the spool. The drag plays an important role in playing and landing fish. A good drag can make the difference between having a trophy fish to hang on your wall or merely telling the sad tale about the one that got away.

Before purchasing a drag system, check how smoothly the drag works. On some inexpensive reels the drag is set and cannot be adjusted. Being able to adjust the drag is necessary for different weights of lures, lines, and water conditions, as well as for playing various sizes of fish. You can check this in the store if the reel has line on it by adjusting the drag and applying various pressures to the line.

The line pickup device is located on the revolving cup that picks up the line and winds it back onto the stationary spool. Line pickup devices most commonly available are the full bail pickup, the open bail or hook pickup, and the manual pickup. Of these, the most common and easiest to operate is the full bail pickup, which is opened before casting and closes itself when the reel handle is turned. The hook pickup is similar to a bail except that it goes only partway across the front of the reel. It operates on the same principle as the bail, but the finger-like hook sometimes catches on clothing and other articles, which has made it less popular than the full bail. The manual system has no pickup device, which makes it much more complicated for a beginner to learn. Most bails



Replacing line on a spinning reel.

or hooks have a line guide that should be made of hard metal because it receives considerable friction from the line as it is retrieved.

CARE

Spinning reels should be kept clean and lubricated according to the manufacturer's recommendations. The reel maintenance that is often overlooked and causes the most problems is improperly filled spools. Spinning reel spools should be filled to within ⅛ of the lip. Too little line will shorten casts and interfere with accuracy; too much line will allow coils of line to spring off prematurely and snarl.

A common error is retrieving line on the spool with uneven pressure. When this happens, tight coils can pull off several loose coils prematurely, which can result in monumental snarls similar to a backlash on a bait-casting reel. Line should always be retrieved with equal pressure. Slack line should be retrieved by applying pressure with the fingers until the line is taut and pressure is applied by water resistance.

When replacing line on a spinning reel, the best way is to insert a pencil, dowel rod, screwdriver, or similar object through the plastic spool of the new line. While someone holds and applies pressure to the spool, the line is wound onto the spinning reel. The end of the line should be threaded through the bail in bail pickup reels and tied to the spool with an overhand slip knot. Another method is to lay the filler spool on the ground and unwind the line in the same direction as it is rewound on the reel. Always be sure to fill the spool to within ⅛ of the lip. This will prevent many problems and should give you hours of trouble-free fishing.

ADVANTAGES AND DISADVANTAGES

The most obvious advantage of using spinning equipment is the great amount of distance you can achieve on casts. In addition, the equipment is easy to operate and available in sizes for all types of fishing.

Disadvantages include the need to maintain even pressure on the retrieving line, which makes the equipment impractical for fishing lures that require a jerky or uneven retrieve. Spinning reels also are more susceptible to snarls than are spin-casting reels. Another disadvantage often overlooked is the way spinning rods must be held during a cast — the wrist must remain vertical and cannot be turned to the side as in bait- or spin-casting. This position can cause fatigue more quickly.

The simplicity of spinning equipment and its popularity for ultra-light tackle still make it a good choice for beginners.

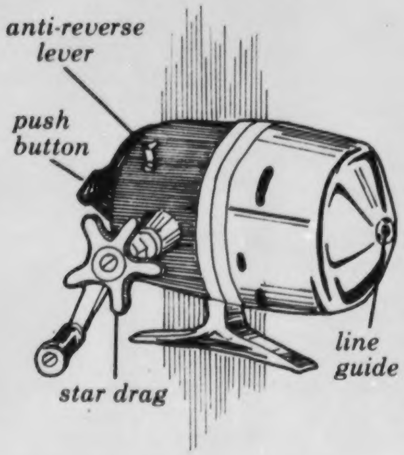
Spin-Casting Equipment

The last category of casting equipment is sometimes referred to as a marriage between bait-casting and spinning equipment because it combines the advantages of both. Spin-casting reels are a "push button" invention for a push-button society. Today this method of fishing is the most popular and has contributed to more people taking up the sport of fishing. Its extreme simplicity has allowed young and old alike to enjoy hours of trouble-free fishing.

REELS

Spin-casting reels operate on the fixed-spool principle of spinning reels, but they are covered with a cone or hood that fastens over the reel spool. In spin-casting reels the line is pulled over the front flange of the spool and then passes through a small opening in the nose of the cone called a line guide. This closed-face system creates more friction than open-face spinning reels, therefore distance of casts is affected somewhat. The covering on the reel, however, entirely eliminates loose coils from coming off the spool too soon and causing snarls. Uneven retrieves are possible with this almost foolproof method of fishing.

Spin-Casting Reel



Spin-casting reels have a button or lever that when depressed allows line to unwind from the spool. Depressing the button a second time after the cast acts as a brake and stops the line from unwinding, which is an easy way of controlling accuracy.

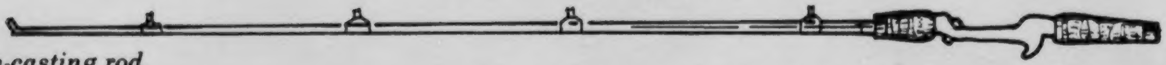
Quality features to look for in spin-casting reels are smooth drag systems, an anti-reverse lever, easily accessible button, line pickup device, metal line guides, and a high gear ratio with metal gears. Drag systems in spin-casting reels are similar to those in spinning reels and should be tested in the same way. Some have star drags on the reel handle as do bait-casting reels, while others have drag-setting knobs on the reel housing. Anti-reverse levers serve the same purpose as they do in spinning reels. Some bait fishermen like to switch off the anti-reverse lever so fish can pull off line without feeling tension. The push button on a spin-cast reel needs to be within easy reach of the thumb. It's a good idea to always try out the reel on a rod before you buy it to make sure your thumb comfortably reaches the button.

The line pickup pin in spin-casting reels functions the same as a bail pickup on spinning reels — it hooks the line and winds it around the spool. The pin should be smooth and made of hard metal such as tungsten carbide to prevent grooves from being worn in it. Some reels have two such pins, which helps ensure immediate line pickup and also helps distribute the friction. Line guides in the front of the nose cone also should be made of a hard material to prevent grooves from being worn by the line.

Spin-casting reels generally come in smaller gear ratios than spinning reels; however, some companies are now marketing spin-casting reels with 4:1 and 5:1 gear ratios. Poorer quality reels sometimes have plastic or soft metal gears which wear out quickly and cause problems. Gears should be precision-made of hard metal for a quiet, smooth retrieve. Some better quality reels contain ball bearings for added smoothness.

RODS

Spin-casting rods are much like bait-casting rods with offset handles, but they are usually longer.



Spin-casting rod.

The following chart should help you select a balanced spin-casting outfit.

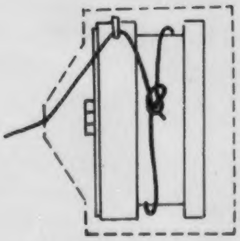
Reel	Rod Action	Rod Length	No. of guides on rod	Line	Weight of Lures
Ultra light	Ultra fast	5-5½ ft.	4-5	2-4 lb.	1/16 - ¼ oz.
Light	Fast	5½-6½ ft.	4-6	4-8 lb.	⅛ - ½ oz.
Medium	Medium	6-6½ ft.	5-6	8-10 lb.	⅜ - ⅝ oz.
Heavy	Stiff	6-6½ ft.	5-6	12-20 lb.	⅜ - 1 oz.

CARE

Rods should be kept clean and protected from knicks and scratches that might weaken them. Recoating guide wrappings periodically will protect the threads. Guides need to be checked for excessive wear and grooves and replaced when necessary. Rod handles, often overlooked, should be cleaned with hot, soapy water.

Spin-casting reels should be cleaned and lubricated according to the manufacturer's specifications. Nose cones collect foreign matter from the line and should be removed and wiped out periodically. In an emergency when fishing, a dirty malfunctioning reel can be temporarily corrected by dowsing it in the water a few times, but it should be taken apart, cleaned, and lubricated as soon as you return home.

When replacing line on a spin-casting reel, the nose cone is removed, then line is threaded through the line guide onto the cone and tied to the reel spool with an overhand slip knot. The cone is then replaced and line is wound onto the spool as described for a spinning reel. The nose cone should be removed periodically to check that the proper amount of line is placed on the spool. Manufacturers recommend how full to fill each spool.



Replacing line on a spin-casting reel.

ADVANTAGES AND DISADVANTAGES

Advantages of spin-casting equipment are numerous indeed. Of all the casting equipment, spin-casting is the most versatile. If you plan to fish for several different species using different lures and baits and want to buy only one outfit, spin-casting is the best one to buy. This equipment also is the easiest to operate and the most trouble free. It is ideal for teaching beginners and many experts continue to use it. Pre-schoolers who once were limited only to cane poles can quickly learn to operate small spin-casting outfits. Another advantage of spin-casting equipment is that it is usually less expensive.

The disadvantages of this equipment continue to be eliminated by manufacturers. Small, light lures used to be hard to cast with spin-casting equipment, but newer ultra-light spin-casting outfits work well with light baits. Higher gear ratios, once not available, are now available with 5:1 ratios.

Spin-casting equipment has combined the advantages of bait-casting and spinning equipment into one simple, trouble-free, versatile piece of casting equipment.

Summary

You now should have enough information to select, purchase, and care for your own personal equipment. You have been given information that also should help you pick out the best method and equipment for you to use in teaching young people how to fish. Before your students learn the skills of fishing, however, it's important for them to understand the parts of their equipment and how it functions. Lesson plans are included to help you teach this information.

Lesson Plans

The following lesson plans are offered as a suggested and field-tested means of teaching this subject material. Activities provided have been taught by teachers, Department of Conservation education specialists and consultants, and youth leaders.

Times are estimated for 50-minute class periods; however, the time needed for each lesson may vary depending upon the teacher and class. Pages marked as student handouts in the appendix may be reproduced for distribution.

ADAPTABILITY TO THE DEVELOPMENTALLY DISABLED

Casting equipment can be adapted to meet specific needs of developmentally disabled individuals. In most cases only a bit of ingenuity and minimal materials will be needed. For instance, rod holders can be fastened to wheelchairs or to a belt worn by individuals who do not have use of both hands. Many sporting goods stores sell a device for tying knots which would help those who may have difficulty.

Fishermen confined to wheelchairs can land their own fish with a long-handled net. For those with little dexterity, the cane pole may be the best piece of equipment because of its simplicity. A bell fastened to the rod, line, or bobber alerts anyone with a sight problem that a fish is on the line.

Safety precautions are particularly important near the water. Brakes on wheelchairs should be checked to make sure they are secure and the chairs are stable. If wheels are wet, brakes may slip, so it's a good idea to block wheels.

Fishing from a boat with pivoting chairs removes handicaps for many people. A life jacket, however, should be worn at all times by anyone in a boat or on land who cannot swim or would be helpless in the water. When fishing with individuals who will need extra help and observation, groups should be kept small or assistants recruited.

No. 1

TITLE: History of Fishing and Fishing Equipment

METHOD: Lecture, class discussion, demonstration

TIME: 50 minutes

PURPOSE: To introduce the sport; to give a historical background on fishing and casting equipment; and to acquaint students with types of rods and reels and their basic nomenclature.

INSTRUCTIONAL AIDS: Fly-fishing outfit, bait-casting outfit, spinning outfit, spin-casting outfit (when actual outfits aren't available use posters from Zebco's A-Z packet showing the four types of outfits); sample hooks, preferably large ones; student handouts in Appendixes 1, 2, and 3.

FACILITIES: Classroom, gymnasium, or outdoors

OUTLINE:

(Lecture)

I. Introduction
   A. Fishing — one of man's earliest activities.
   B. Began as a quest for food.
   C. Has developed into one of man's favorite sports — more than 60 million Americans participate.
II. History
   A. Early methods of fishing
      1. Hand fishing or noodling.
      2. Clubbing fish.
      3. Nets, seines, traps.
      4. Tools.
         a. Spears
         b. Bow and arrow
         c. Gorge (forerunner to the hook) — a piece of rock, bone, or wood tapered at both ends with a groove in the middle for fastening the line
   B. Fish hooks
      1. First hooks were made of bone, thorns, wood, or stone.
      2. Modern steel hook construction was born in Redditch, England, about 1560.
      3. First steel hook manufacturers were needle manufacturers.
      4. Charles Kirby developed methods of tempering and hardening steel fish hooks in 1651 that are still used today.
      5. Firm of O. Mustad & Son became a world leader in steel hook production. Today they market over 60,000 different types of steel fish hooks.

Materials needed: Student handout on hooks, Appendix 1.

      6. Correct hook design is as important as correct manufacturing techniques.
         a. The four most important elements of hooks are penetration, holding power, strength, and lightness.
         b. Greater penetration occurs when a hook is made so the line of penetration is parallel to

the direction of pull.

c. S. M. Wright and A. D. McGill perfected hook design with their invention of the Eagle Claw hook — bite of hook is parallel to the shank and only the point of the hook is curved toward the eye of the hook.

(Class Demonstration)

Materials needed: Bar of soap, two styles of hooks, line.

d. To demonstrate the hooking power of a hook, use a bar of soap and two styles of hooks. Tie about 18 inches of line to each hook. Pull the line and hooks slowly across the soap. Let students see how different hooks penetrate the soap. (For example, a double offset hook will twist as it penetrates.)

C. Development of casting equipment.
  1. Fishing lines
    a. First materials used were animal gut, leather, vines, horse hair, and piano wire.
    b. Braided cotton and silk lines were developed to use on reels.
    c. Modern synthetic lines such as braided Dacron and nylon were another improvement.
    d. A single strand of strong synthetic fiber known as monofilament is the most popular fishing line in use today.
  2. Fishing poles and rods
    Early fishing rods of bamboo and metal evolved into today's solid fiberglass, hollow fiberglass, and graphite rods.
  3. Fishing reels
    a. Reels were developed to fish bait farther from the fisherman and in deeper water.
    b. First mention of fishing reels in print appeared in Thomas Barker's book "The Art of Angling" in 1651.

Materials needed: Four types of fishing reels, Zebco posters showing reels, or student handout on reels in Appendix 2.

    c. Four types of reels have been developed.
      (1) Fly reels
        (a) Store line only — not involved in casting process.
        (b) Positioned under the rod.
      (2) Bait-casting reels
        (a) Developed to cast natural bait and heavy lures.
        (b) Often considered the most accurate type of reel.
        (c) Have a free spool that revolves, which requires more skill to operate.
      (3) Spinning reels
        (a) Have a fixed spool that does not turn.
        (b) Involve less friction in the casting process so provide more distance.
        (c) Positioned under the rod.
      (4) Spin-casting reels
        (a) Sometimes referred to as "pushbutton" reel.

(b) Also have a fixed spool and operate on the same theory as a spinning reel, but spool, drag, and pickup mechanism are enclosed inside a hood or nose cone.
(c) Simplest and most versatile.

Materials needed: Student handout on rod parts, Appendix 3.

III. Fishing Rods
A. Purpose — to work with muscles of the arm to propel a weight
B. Modern rod materials
1. Solid fiberglass
a. Inexpensive, strong, easy to handle.
b. Heavy, lacks sensitivity.
2. Tubular fiberglass
a. Inexpensive, strong, easy to maintain, lightweight, more sensitive.
b. More susceptible to breaking, slightly more expensive.
c. Most commonly used rod material today.
3. Graphite
a. Stronger, lighter weight, more sensitive than fiberglass.
b. Expensive.
4. Mixture of graphite and fiberglass
New process attempting to keep cost down yet maintain advantages of graphite — may become material of the future.
5. Boron
a. Lighter weight, stronger, more sensitive than graphite.
b. Expensive.
C. Rod action
1. Defined as the shape the rod assumes when exposed to stress.
2. Actions described as ultra-light, light, medium, and heavy or "worm" action.
3. Most rods marked by manufacturer to indicate their action.
4. If not marked, actions determined by following process:
Hold rod horizontally and slap wrist downward causing rod to bend or curve.

Note to instructor: Demonstrate all four actions using the method described.

a. Ultra-light action if all curvature occurs in upper 1/4 of rod.
b. Light action if all curvature occurs in upper 1/3 of rod.
c. Medium action if all curvature occurs in upper 1/2 of rod.
d. Heavy action if all curvature occurs progressively through the entire rod shaft.
5. Best action to use determined by type of casting equipment used and type of bait or lure used.
D. Rod ferrules
1. Connecting devices used in two- or three-piece

rods.
2. Metal ferrules most common.
3. Fiberglass ferrules becoming more common — rely on a taper fit.
4. Self-material ferrules made from same material as rod.
5. Butt ferrule — fastens grip to rod.

E. Rod handle or grip
1. Rubber becoming more popular than cork because it's more durable, easier to clean, and more comfortable to hold.
2. Shape varies with different types of rods, but is important for accuracy in casting.

F. Reel seats
1. Fasten the reel to the rod.
2. Metal most common but plastic sometimes used.
3. Lock screw system used for bait- and spin-cast rods; lock ring system used for spinning and fly rods.

G. Rod guides
1. Control line by keeping it horizontal to rod and distribute stress evenly along rod when line pressure is applied.
2. Number of guides on a rod important — good quality rod generally has one guide for every 12 inches.
3. Common material — stainless steel; ceramic guides becoming popular because they outwear others and cause less friction.
4. Specialized guides — rod tip guide on end of rod and stripping guide which is lowest guide on a fly rod.
5. Guides fastened to rod by wrapping with nylon thread that is then coated with polyurethane finish.

H. Care of rods
1. Wipe clean with a damp cloth after use.
2. Clean guides, check for grooves, replace when rusty or worn.
3. Clean rod handles with soap and water.
4. Recoat rod guide wrappings.
5. Keep ferrules and reel seats free of dirt and rust, but don't apply oil for it attracts dust and dirt.
6. Store rods by hanging them vertically; don't lean them against walls.

IV. Fishing Reels

A. Line holders — forerunners of reels, consisted of two pegs or a notched board fastened to the pole so line could be wrapped around.

B. Primary functions — store line, act as a counterweight to balance the weight of the rod, help in casting and then playing hooked fish (fly reel does not serve this function).

C. Drag system

1. Defined as an adjustable tension control that helps prevent large fish from breaking line.
2. Is adjustable and should be set according to weight of line used.

D. Four basic types of freshwater reels
  1. Fly reels
    a. Mounted underneath rod and used to store line.
    b. Automatic reel — by pressing a lever, line is automatically retrieved.
    c. Single-action reel — reel handle must be turned to retrieve line.
  2. Bait-casting reels
    a. Mounted on top of rod.
    b. Have a revolving spool that creates friction which shortens casts.
    c. Spool tension controlled by thumb which makes casting more accurate but harder to learn.
  3. Spinning reels
    a. Mounted underneath rod.
    b. Non-revolving spool — two types.
      (1) Open face — spool exposed
      (2) Closed face — spool covered
    c. Create little friction which allows longer casts.
  4. Spin-casting reels
    a. Mounted on top of rod.
    b. Non-revolving spool covered by a nose cone or hood.
    c. Most versatile and easiest to cast.

E. Gear Ratio
  1. Refers to how many revolutions of line are wound onto the spool by each turn of the handle.
  2. Gear ratio of at least 3.5:1 for most quality reels.
  3. Ratio of 5:1 needed for fishing fast-action lures requiring fast retrieves.

F. Reel size — determined by size and action of rod.

G. Care

Disassemble, clean, and lubricate according to manufacturer's directions.

Note to instructor: Disassemble spin-cast reel and point out where it should be cleaned and lubricated.

No. 2

TITLE: Fishing Lines and Knot Tying

METHOD: Lecture, demonstration, class exercises

TIME: 50 minutes (more time may be needed to practice tying knots)

PURPOSE: To acquaint students with facts about fishing lines and leaders so they can make a wise selection; to teach students how to tie some common, useful fishing knots.

INSTRUCTIONAL AIDS: Samples of braided lines, different weight monofilament lines, fluorescent lines, leaders, student handout in Appendix 4.

FACILITIES: Classroom, gymnasium, or outdoors

OUTLINE:

I. Introduction
Next to the hook, fishing line is often considered the most important part of casting equipment.

(Lecture)

II. Fishing line characteristics — match lines to their intended use.
  A. Stretch
    1. Controlled by manufacturers.
    2. Serves as a shock absorber and helps prevent line breakage.
    3. Knowing how line reacts to stretch important for setting drag properly.
    4. More line cast out, more stretch line has.
  B. Abrasion resistance
    1. Built in by manufacturer.
    2. Helps line maintain its original strength even when fishing around rocks and other underwater obstructions.
  C. Knot strength
    1. Important because weakest part of any line is the knot.
      a. Each line will react differently to various knots and splices.
      b. Knots should be chosen carefully to retain as much of the original line strength as possible.

(Class Exercise)

      c. Pass out sections of 8-10-pound-test monofilament to students and have them try to break the line. Discuss how difficult it is. Have students tie an overhand knot in the middle of the line and then try to break it. The line should break easily. This exercise shows the importance of selecting the proper knots and tying them correctly so that line is not weakened significantly.
    2. Lines classified by two methods — test line and class line.
  D. Rigidity
    General rule — the heavier the line, the stiffer the

Materials needed: Several two-feet sections of 8-10-pound-test monofilament line.

line.

III. Monofilament line
  A. Most popular line used today.
  B. Most versatile line available.
  C. Consists of a single strand of nylon.
  D. Available in a wide range of colors, weights, and rigidity.

IV. Braided fishing line
  A. Soft, flexible line that lays well on reel spools.
  B. Most common freshwater use is cane poles, baitcasting reels, and backing line on fly reels.
  C. Made from nylon and from Dacron — Dacron lines stiffer with little stretch.
  D. Available in both hard and soft line in weights from 4- to 160-pound-test.

V. Fly lines and leaders
  A. Weight, not strength, important.
    1. Weight must be matched to rod.
    2. Most quality fly rods are marked to indicate what weight line to use.
  B. Number system used to classify line.
    1. Numbers 1 through 14 are the most common, with 1 being the lightest.
    2. The number is usually preceded by a lettering system which describes the line's physical qualities.
      a. (L) for level.
      b. (DT) for double taper.
      c. (WF) for weight forward.
    3. Following the weight number is another lettering system which describes how the line will react in water.
      a. (F) for floating — easier to cast than sinking.
      b. (S) for sinking — classified as slow sinking, fast sinking, and extra-fast sinking; allows flies to be fished at different water levels.
      c. (FLS) for floating line/sinking tip.
  C. Most lines constructed by coating plastic over a braided line — thickness of plastic coating determines taper.
  D. Leaders required for some fishing — prevent fish from seeing the heavy fly line.

VI. Care of fishing lines
  A. Clean periodically with a damp cloth.
  B. Store off the reel spool in large coils to prevent twists from occurring.
  C. Store monofilament line in a cool dark spot — heat weakens the line.
  D. Check monofilament line for abrasions; change after long-term storage on a reel.
  E. Keep fishing lines away from gasoline, insect repellent, and suntan lotions.

VII. Popular fishing knots

Note to instructor: While this module contains instructions for tying 14 commonly used fishing knots, the lesson plan covers only six of the most common and useful of those 14 knots. All six knots are based on the clinch knot and are used for bait and lure fishing. If you are teaching fly fishing, you should select knots more common to fly fishing that are described in this module. Materials include braided nylon cord, coat hangers, and 6-10-pound-test monofilament line. Begin students with the nylon cord and hooks fashioned from the coat hangers. After they have mastered the knots with the nylon cord, allow them to practice with the monofilament line. Be sure to emphasize that heat weakens monofilament line and when pulling a knot tight they should moisten the knot and pull slowly to tighten. The skill of wisely selecting knots and properly tying them is important to successful fishing and should be mastered before moving on.

A. The weakest part of any fishing line is the knot.
B. All lines have particular knots that function best with that particular line.
C. Fishing knots can be classified into three major groups.
   1. Line-to-line knots
   2. Line-to-leader knots
   3. Line-to-lure knots

VIII. Knot-Tying Exercises

The following procedure should be followed for all of the knot-tying exercises.

1. Pass out practice wire hooks, at least one per every two students, preferably one per student.
2. Pass out 18 inches of braided nylon cord to every student.
3. Pass out student handout in Appendix 4 or use overlays.
4. Go through step-by-step procedure for tying the knot (refer to drawings and instructions in text of module).
5. Have students repeat tying knot. Check for problems.
6. Cut knots free and repeat tying as many times as needed for students to master.

A. *The Improved Clinch Knot*
   1. One of the most popular knots — sometimes referred to as the "fisherman's knot."
   2. Used to tie hooks and lures to lines and leaders.
   3. Should be mastered first because other five knots are based on this knot.
   4. About 10 percent stronger than the regular clinch knot.

B. *The Clinch Knot*

   Same as the improved clinch knot except that the end of the line is not passed back through the big loop.

C. *Loose Loop Clinch Knot*
   1. Used to fasten artificial lures known as crank baits to a line.
   2. Allows the lure more freedom of movement for more action.
   3. Same as the improved clinch knot with one added step.

D. *Quick Snell Knot*
   1. One of the strongest knots available.
   2. Ensures the line of force will be parallel to the line of hook penetration, giving better penetration and holding power.
   3. Works best with 10-pound-test line or heavier.

E. *Basic Blood Knot*
   1. Used for joining two lines together.
   2. Uses two clinch knots, end-to-end.
   3. Tying the Basic Blood Knot.
      a. Have students work in pairs and each

partner should use one end of his line and one end of his partner's.
        - b. While this knot is strong, it can be made stronger by tying two improved clinch knots end-to-end instead of two clinch knots.
- F. *Double-Strand Blood Knot*
    - 1. Used with light line to strengthen the knot or to give added strength when attaching a lure.
    - 2. Also used when connecting a light line to a heavy line for added strength.
    - 3. Tied in the same manner as the Basic Blood Knot except that the end of the lighter line is doubled and used as if it were a single.
    - 4. Tying the Double-Strand Blood Knot
        - a. Students should still be with a partner.
        - b. Pass out a 36-inch piece of 10-pound-test or heavier monofilament line to each pair.
        - c. Each partner will use one end of the nylon cord and one end of the monofilament line to tie this knot.
        - d. When both people in each pair finish their knots the pair will have a circle made from nylon cord and monofilament line.

No. 3

TITLE: Selection and Care of Casting Equipment

METHOD: Lecture, class discussion

TIME: 50 minutes

PURPOSE: To teach students what they need to know to select the casting equipment that would best serve their personal needs and then to take proper care of it.

INSTRUCTIONAL AIDS: Examples of actual equipment if it's available. (Check about borrowing equipment from an Outdoor Skills Specialist at the Department of Conservation or a local retail store that sells fishing equipment.)

FACILITIES: Classroom, gymnasium, or outdoors

OUTLINE:

I. Introduction
- A. Casting equipment, like equipment in other sports, plays a major role in how successful one is in the sport.
- **(Lecture)** B. Fishermen need a good working knowledge of their equipment to get the most efficient use from it and to maintain it properly.
- C. An investment in casting equipment should be for quality equipment. Cheap equipment is often hard to use and requires more maintenance.

II. Balanced Equipment

A. Casting equipment consists of four major components — rod, reel, line, and lure or bait. These four components must work together for efficient casting to take place.

B. "Balanced" equipment refers to the four components working together.

1. *Rod and Reel Relationship*
   Don't put a large reel on a small, light rod or a small reel on a large, heavy rod.
2. *Reel and Line Relationship*
   Don't use heavy line on a small, light reel or light line on a heavy reel.
3. *Rod and Lure Relationship*
   a. This relationship can vary from person to person based on casting technique, but for each rod, there is a specific weight lure which will perform best for an individual. Casts made with the correct weight lure bend the rod to its peak load so it functions best for the user.
   b. In fly fishing the weight of the line carries the lure, instead of the weight of the lure carrying the line, but the same principles apply.
4. *Lure and Line Relationship*
   a. This relationship is important in bait-casting, spinning, and spin-casting because the weight of the lure pulls the line from the reel.
   b. Three forces act on lure and line during cast — friction between line and rod guides, wind resistance, and gravity.
      (1) Light line is affected less by these forces than is heavy line. The lighter the line, the more distance on casts, but also the more likelihood of the line breaking.
      (2) Heavy lures require heavy line to set hooks. Too heavy a lure will break the line.
   c. On open-face spinning reels, a heavy line used with a light lure will continue to spring off the spool as the lure stops. Beginning spin fishermen should start with lighter lines.
5. *Rod and Line Relationship*
   a. Fly rods are marked to indicate the size line to use on them, but with other rods the user must make the decision.
   b. Every rod has an ideal pound test line for it. A versatile rod is a great asset for generalized fishing because it provides a wider range of line to choose from based on lures used and conditions.
   c. A good rule of thumb in selecting line is to select one heavy enough to withstand your

Note to instructor: Show chart from module on correct line to use with different weight lures.

strongest casts, then add a few pounds for insurance.

d. Balanced tackle, or the proper combination of rod, reel, line, and lure, is an important key to successful fishing. Some manufacturers sell rod, reel, and line kits that already are balanced and need only to be matched with the type of lure or bait to be used.

III. Five major categories of Freshwater Casting Equipment — cane pole, fly-casting, bait-casting, spinning, and spin-casting.

A. Type of fish being sought, type of water conditions, and the bait or lure being used will dictate the category of casting equipment to be used.

B. After the category of casting equipment is selected, it is important to select the proper size of equipment for the fish sought and the bait or lure to be used.

IV. Cane Pole Equipment

A. Only category that does not employ the use of a reel. Most commonly used with live bait, although can be used with almost any type of natural or artificial bait.

B. Features
1. Usually 8 to 20 feet long.
2. Most common materials used are Calcutta cane, fiberglass, aluminum, or bamboo.
3. Some poles are one piece, while others are two and three pieces.
4. Some are a bare pole, while others have a tip-top guide, cork handles, and a built-in place to wrap extra line.
5. Strength and flexibility are the two most important components.
6. Most common line used is a braided nylon or Dacron. Line weight should be matched to the strength of the pole and should be at least as long as the pole but no longer than the combined length of the pole and its user's arm.

C. Maintenance
1. Periodically check for weak spots.
2. Varnish or shellac cane and bamboo poles occasionally to prolong their life.
3. To store, loosely wrap line around pole. Store poles horizontally or hang them to prevent bends.

D. Advantages
1. Simple, inexpensive, easy to use.
2. Useful in special situations such as fishing brushy shorelines where conventional casting equipment would be difficult to use.

E. Disadvantages
1. Absence of reel and drag system.

2. One-piece poles hard to transport and store.
3. Artificial lures hard to fish effectively on cane poles.

V. Fly-Casting Equipment
   A. Rods
      Come in different lengths, actions, weights, and powers which are usually labeled on the rod. (See chart on page 40 to select proper tackle.)
   B. Lines
      Should be matched to the fly rod.
   C. Reels
      Must be balanced with rod and feel comfortable to user.
   D. Maintenance
      1. Store horizontally or hang vertically to prevent permanent bends from occurring.
      2. Be careful not to damage the guides on the rod itself. Metal or plastic tube cases are worth the investment.
      3. Clean and lubricate at least once a year according to manufacturer's specifications.
      4. Clean fly lines and store on the reel year around. (To teach how to replace fly line, refer to page 41.)
   E. Advantages
      1. Allows very light lures to be cast.
      2. Provides the satisfaction of casting and playing fish without the aid of a reel.
   F. Disadvantages
      1. More difficult skill for most people to master.
      2. Affected more by wind.
      3. Requires more open space for long back casts.
      4. Limits fishermen to using light baits or lures.

VI. Bait-Casting Equipment
   A. Available in various sizes and strengths — choice depends on size of bait or lure to be used and the structural hazards of the water to be fished. (See chart on page 42 for information on selecting balanced equipment.)
   B. Rods
      1. Usually the shortest of the different types of rods.
      2. Medium action with offset handles most common.
      3. Ceramic insert guides used on better quality rods.
   C. Reels — quality features to look for when selecting equipment
      1. *Level wind mechanism* of hard metal.
      2. *Adjustable drag* to eliminate backlashes.
      3. *Star drag systems* for quick adjustments.
      4. *Quick takedown screws.*
      5. *Free spool lever* with easy accessibility.
      6. *High gear ratio.*

- D. Maintenance
  1. Because of friction on reel, lubrication is important. Lubricate reels according to manufacturer's specifications.
  2. Beginners should use braided line because it requires less precise thumbing when casting, which results in fewer backlashes.
  3. Store rods horizontally or hang them vertically.
  4. Check guide wrappings periodically for wear and recoat if necessary.
  5. Clean rod handles with soap and water.
  6. To replace line on a bait-casting reel, refer to page 43.
- E. Advantages
  1. More accurate for casting.
  2. Allows the use of heavy line and baits.
  3. Reels function well with the jerky, uneven retrieves required to fish certain artificial lures.
- F. Disadvantages
  1. Possibility of backlash.
  2. Harder to master.
  3. Creates more friction which cuts down on casting distance and makes fishing light baits or lures more difficult.
  4. More expensive.

VII. Spinning Equipment

- A. Comes in all sizes and strengths — choice depends on size of bait or lure to be used. (See chart on page 45 for information on selecting balanced equipment.)
- B. Rods
  1. Usually longer than bait- or spin-casting rods.
  2. Guides usually larger, with lowest guide especially large to reduce line coils as they come off the spool.
- C. Reels
  1. Fasten underneath the rod.
  2. Left-hand retrieve used on most reels.
  3. Gear ratios of 3.5:1 through 5:1.
- D. Features of quality spinning reels
  1. *Snap-off spools.*
  2. *Anti-reverse devices* to prevent reel spool from backwinding when pressure is applied to the end of the line.
  3. *Drag adjustments* on the front of the spool that operate smoothly and allow a wide range of adjustment.
  4. *Line pickup devices* (bail type most common).
  5. *Line guides* made of hard metal.
- E. Maintenance
  1. Keep rods clean and periodically check guide wrappings.
  2. Clean reels at least once a year and lubricate according to manufacturer's specifications.
  3. Keep spool filled to the spool lip.

4. Retrieve line with even pressure to avoid snarls and tangles.
5. To replace line on a spinning reel, refer to page 46.

F. Advantages
1. Longer casts possible.
2. Easy to operate and available in a wide range of sizes.
3. Can use light line and lures.

G. Disadvantages
1. Cannot be used with jerky retrieves.
2. More susceptible to line snarls than spin-casting outfits.
3. More tiring to use because wrist must remain vertical during casting.

VIII. Spin-Casting Equipment

A. Sometimes referred to as a "marriage" between bait-casting and spinning equipment — takes advantages of both types and combines them in one outfit. (See chart on page 48 for information on selecting balanced equipment.)

B. Rods
1. Much like bait-casting rods, only longer.
2. Offset handles.

C. Reels
1. Stationary spool covered by hood or nose cone.
2. Button or lever pushed to release line.

D. Quality features in spin-casting reels
1. Smooth, easily accessible *drag systems*.
2. *Anti-reverse lever*.
3. Easily accessible comfortable *release button or lever*.
4. *Line pickup pins* made of hard metal.
5. *Line guide* built in reel cover made of hard metal.
6. Smaller *gear ratios* than spinning or bait-casting reels (some new, better quality models are available with gear ratios as high as 5:1).
7. *Metal gears* that are precision made for quiet, smooth operation.
8. *Ball bearings* for added smoothness.

E. Maintenance
1. Keep rods clean and periodically check guide wrappings for wear.
2. Clean reels at least once a year and lubricate according to manufacturer's specifications.
3. Remove nose cones frequently and clean.
4. To replace line on a spin-casting reel, refer to page 48.

F. Advantages
1. Most versatile of all types of casting equipment.
2. Easiest to operate.
3. Ideal for teaching beginners.
4. Usually less expensive than other types of

casting equipment.

G. Disadvantages
  1. Shorter casts than with spinning equipment.
  2. Less accuracy than with bait-casting equipment.

No. 4

TITLE: Review and Evaluation

METHOD: Question and answer, student activity, written evaluation and skill evaluation

TIME: 50 minutes (add another 50-minute period for skill test)

PURPOSE: To review the material and evaluate the students' learning progress.

INSTRUCTIONAL AIDS: Student handouts and crossword puzzle

FACILITIES: Review and written evaluation (classroom and at home)
Skill test (play field or gymnasium)

Materials needed: Crossword puzzle in Appendix 5, take-home exam in Appendix 6.

OUTLINE:

I. Review
  A. Review by asking questions and answering student questions.
  B. Hand out crossword puzzle activity.

II. Written Evaluation
  Hand out take-home exam

III. Skill Evaluation
  Administer skill test

IV. Evaluate the course based on course objectives.

Suggested examination

A take-home exam is recommended upon completion of this class. The objectives of the course are to prepare students to select their own personal equipment based upon the type of fishing they plan to do. Instructors, therefore, are encouraged to give students the "Personal Casting Equipment Selection Guide" in Appendix 6. Students should take the guide to a store and fill out the information for the type of equipment they would choose if they were buying it. Then students should explain why they chose the equipment they did and how they would store and maintain it.

Suggested skill test

Knots are an important skill to master and students should be tested on their ability to tie the following basic knots: improved clinch, clinch, loose-loop clinch, quick snell, basic blood, and double-strand blood. Have students 1) tie each knot individually for the instructor or 2) pass out 12- to 18-inch sections of heavy monofilament or braided nylon line and have each student tie the six knots, then turn them in.

Glossary

ACTION	The amount of the total length of a fishing rod involved in the curvature the rod assumes under normal stress.
ANTI-REVERSE	A device on some fishing reels that prevents the reel handle from turning backwards.
BACKING	A soft, strong fishing line, such as braided Dacron, that is wound onto a fly reel before the fly line is added. It protects against a fish stripping all the line from the reel.
BACKLASH	A tangle or snarl of fishing line that is most common to bait-casting reels. It is caused by the spool continuing to revolve after line no longer is being pulled from the spool. It is also called a "bird's nest."
BARB	The spur found on the point of most fish hooks that serves to increase the holding power of the hook.
BAIT-CASTING	Name given to casting equipment that employs a bait-casting reel. The reel is sometimes called a "plug-caster" or a "level-wind" reel.
BAIL	The part of some spinning reels that picks up the line and winds it onto the spool.
BITE	The part of a fish hook that is located between the bend of the hook and the point.
BLANK	Name given to a rod before it has the handle, ferrules, and guides attached.
BRAIDED LINE	A fishing line constructed of several small strands braided together to form one larger line.
BRAKE	Sometimes referred to as a "clicker" or "click mechanism" because of the sound it produces, it is found on some reels, especially fly- and spin-cast reels. The brake is helpful in signaling a strike and it also prevents the spool or line pickup mechanism from turning while being transported.
CANE POLE	Name given to casting equipment that employs a long, slender rod and no reel. The name originated from Calcutta cane which was used to make the poles. Cane poles are sometimes called "bank poles."
CASTING DRAG	An adjustable spool tension control found on quality bait-casting reels. It allows a fisherman to preset the spool tension to match the weight of the lure or bait being cast.

CLASS LINE	A method used by European manufacturers to classify fishing line based on tensil strength. This system labels a line as guaranteed to break as near as possible to the stated class line strength, but not at or above it.
CLICKER	See "brake."
CLOSED-FACE	A reel that has a hood or nose cone covering the line and stationary spool.
CONE	A device found on spin-casting reels and closed-face spinning reels that covers the spool and prevents the line from springing off the spool during a cast. It also protects the spool from dirt and grit. It is called a "nose cone," "hood," or "reel cover."
DRAG	An adjustable tension control on reels that, when properly set, prevents a strong fish from breaking the line or rod on a strong run. Drag is set according to the weight of line. Some drags, such as "star drags" are easily accessible so they can be adjusted while playing a fish.
EAGLE CLAW DESIGN	A patented hook design that curves the point inward, pointing toward the eye of the hook while leaving the bite of the hook parallel to the shank of the hook. This greatly increases hook penetration and holding power.
EYE	The part of a fish hook where line is attached or where the hook is attached to a lure.
FERRULE	A connecting device used to fasten together multi-piece rod sections.
FISH ARROW	An arrow fitted with a barbed point that is used for bowfishing. Points are usually removable so arrows can be pulled from fish. Most fish arrows are constructed of solid fiberglass to give them strength and added weight for penetration.
FIXED SPOOL	A spool that does not turn when casting or retrieving line; used on spinning and spin-casting reels.
FLY-CASTING	Name given to casting equipment that employs a fly-casting reel.
FREE SPOOL	A spool that disengages from the handle and turns freely, thus reducing friction; used on bait-casting reels.
GATHERING GUIDE	The largest guide on a spinning rod that is located nearest the reel. It serves to gather the line coils coming off the reel and reduce their size.

GEAR RATIO	The ratio based on the number of coils of line returned to a reel spool for every one turn of the handle.
GIG	A type of fish spear; it resembles a small pitchfork with barbed points.
GORGE	The forerunner to the fish hook, it was a piece of wood, bone, or stone, tapered to a point at each end with line attached around a groove in the middle. When swallowed by a fish, the gorge could be lodged sideways in the gullet by pulling on the line.
GRIP	The part of a fishing rod that a fisherman holds during a cast; sometimes called a "handle."
GUIDE	Small rings or arches attached to a rod that keep the fishing line running parallel to the rod and help distribute stress evenly.
HOLDING POWER	A component of hook design that refers to the hook's ability to hold the fish while it is being played.
HOOD	See "cone."
KIRBED	A fish hook design that offsets the point and barb of the hook to increase penetration. In some designs the bend also is offset in relation to the shank. Some hooks have an offset bend in the shank to increase penetration.
LEADER	A piece of fishing line or wire added to the front of the main fishing line, it is used to reduce how visible the line is to fish and to strengthen the line.
LEVEL WIND MECHANISM	The part of a bait-casting reel that ensures the line is rewound evenly onto the spool.
LINE GUIDE	A device found on spinning and spin-casting reels that helps guide line back onto the spool. On spin-casting reels it is located at the opening of the reel cover and also functions as a gathering guide during casting. On open-face spinning reels it is located on the bail. Good quality line guides are made of a hard material to resist wear.
LURE	Artificial bait; sometimes called a "plug."
MONOFILAMENT LINE	A single, strong synthetic fiber used as fishing line.
NATURAL BAIT	Bait that is not artificial, but is organic in nature and common to a fish's environment.
NOSE CONE	See "cone."
OFFSET HOOK	See "kirbed."

OPEN-FACE	A spinning reel that has the spool uncovered or exposed.
PENETRATION	A component of fish hook design that refers to the hook's ability to penetrate the fish's mouth.
PICKUP DEVICE	The part of a fixed-spool reel system that catches the line and turns it back onto the spool.
PLUG	See "lure."
POUND TEST	A method of classifying fishing line based on tensil strength. This system usually is stated in an even number which represents pounds. The line is guaranteed not to break when wet below the stated poundage. This system is sometimes referred to as "test line."
RECOIL POWER	The power or strength a bent rod will generate as it returns to its original shape.
REEL COVER	See "cone."
RETRIEVE	The act of rewinding line onto a reel spool.
RIGIDITY	A characteristic of fishing lines based on how stiff or limp they are.
SHANK	The longest part of most fish hooks, it is between the eye and the bend of the hook.
SNELLED HOOK	A hook that is fastened to a fishing line using a knot that is tied around the shank of the hook.
SPIN-CASTING	Name given to casting equipment that employs a spin-casting reel, which is also called a "push-button" reel.
SPINNING	Name given to casting equipment that employs a spinning reel.
SPOOL	The part of the reel on which the line is wound.
STAR DRAG	A drag system on a reel with an adjustment knob that is enlarged and readily accessible for quick adjustments.
STRIPPING GUIDE	The lowest guide on a fly rod located nearest to the reel. This guide receives heavy wear and on quality rods is constructed of a hard material.
TAPER	A fishing line or leader whose diameter is tapered so the end is smaller in diameter than the rest of the line, which makes the line less visible and reduces tension.
TEST LINE	See "pound test."

TIPPET	The small, front section of a tapered leader to which the lure is attached.
TIP-TOP GUIDE	The guide farthest from the rod handle that is fastened to the tip of the rod. This guide receives much wear and on quality rods is made of a hard material.
TROLLING	A method of fishing in which bait or lure is allowed to drift behind a boat powered by a motor or the water current.
ULTRA-LIGHT	A general name given to casting equipment that is reduced in size for casting small, lightweight lures.
WORM ACTION	A name given to a rod action that is usually synonymous with heavy action. The action common to casting rods used to fish plastic worms.
WRAPPING	Thread or other material wound around the rod and guide to secure the guide to the rod.

Bibliography

References

Bates, Joseph D., Jr., *Elementary Fishing.* New York: Popular Library, 1967.

Bates, Joseph D., Jr., *Fishing.* New York: E. P. Dutton & Company, Inc., Sunrise Books, 1973.

McNally, Tom, "All About Fishing Reels." Chicago: American Fishing Tackle Manufacturers Association, 1975.

McNally, Tom, "All About Fishing Rods." Chicago: American Fishing Tackle Manufacturers Association, 1974.

Pfeiffer, C. Boyd, "All About Fishing Lines." Chicago: American Fishing Tackle Manufacturers Association, 1977.

Wolff, Dick, *Fishing Tackle and Techniques.* New York: Popular Library, 1961.

Equipment sources

Fishing equipment, visual aids, and handouts are available to help instructors conducting fishing classes. Materials usually can be obtained with a bit of resourcefulness and some letter writing.

A good source is the AFTMA, which stands for the American Fishing Tackle Manufacturers Association.

AFTMA maintains a free film loan library, has handouts available, and can help in obtaining equipment to use in classes. Their address is:

AFTMA
2625 Clearbrook Drive
Arlington Heights, IL 60005

Another good source is the manufacturers themselves, many of whom realize that promoting fishing is promoting their equipment. They are willing to help instructors who write to them requesting information. Most companies have a promotional or advertising department to which letters should be addressed, and addresses are available from stores selling the equipment. Local stores or retail outlets that sell fishing equipment are sometimes good sources too.

Fishing equipment can sometimes be obtained through donations or by borrowing it. If equipment is purchased, most companies offer educational group prices.

The Wright & McGill Company has a consignment program on rods and reels. Instructors can use the rods and reels for nine months at no cost. At the end of nine months, they either purchase the equipment or sell it to the students at a low cost. Money-raising projects during the school year, such as a plug-casting contest, are a good way to raise money to buy the equipment.

For more information, write:

Wright & McGill Company
Attn: Training Tackle
4245 East 46th Avenue
Denver, Colorado 80216

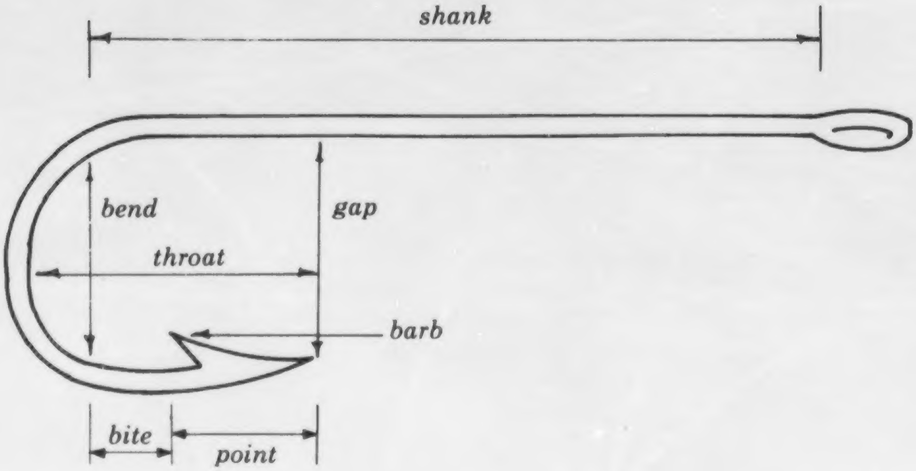
Another company that has an educational program is Zebco. Zebco publishes an instructor packet called "Fishing A to Z," which contains an instructor guide, student booklet, film list, four wall charts on equipment nomenclature and fish identification, and score cards for casting contests. The packet also contains a post card which can be used to order student books at no cost. Zebco also may donate rods and reels or sell them at reduced prices to educational programs.

For more information, write:

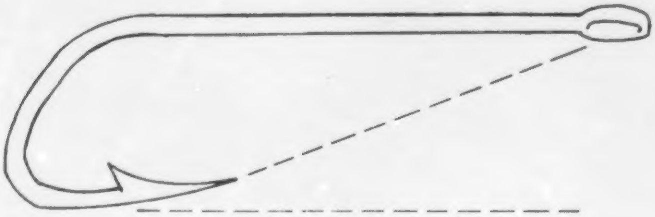
Zebco Division Brunswick Corporation
Attn: Ad Service
P.O. Box 270
Tulsa, Oklahoma 74101

The Missouri Department of Conservation's Outdoor Skills Education Unit maintains a limited supply of equipment and visual aids to help new programs get started. Workshops are conducted which provide training in how to teach casting and angling. Names and addresses of Outdoor Skills Specialists are listed in the back of the module.

Appendix 1—Parts of a Hook

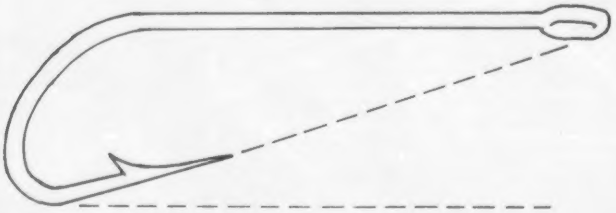

shank
bend
gap
throat
barb
bite
point

Eagle Claw Design



Only the point curves inward, which gives more penetrating and holding power.

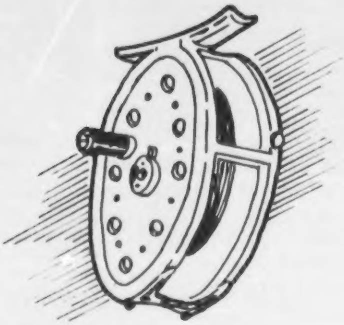
Pennell Design



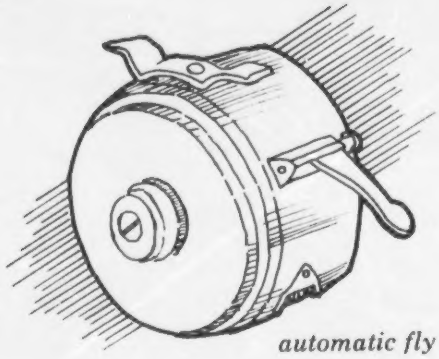
Both point and lower tip section curve inward pointing to the eye, resulting in inferior hooking power.

Appendix 2—Fishing Reels

Fly-Casting Reels

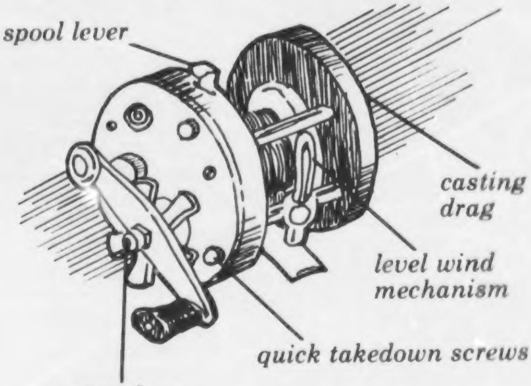


single-action fly reel

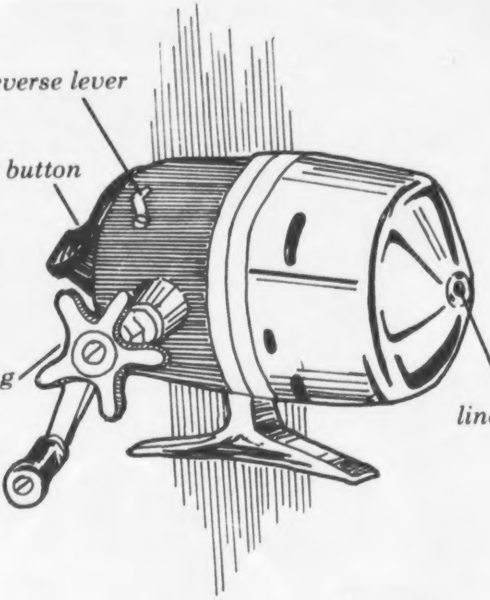


automatic fly reel

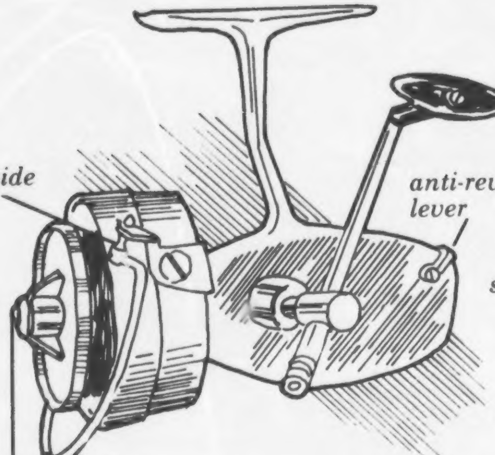
Bait-Casting Reel


free spool lever
casting drag
level wind mechanism
quick takedown screws
star drag

Spin-Casting Reel

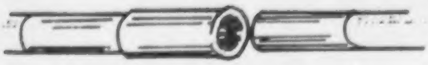

anti-reverse lever
push button
star drag
line guide

Spinning Reel

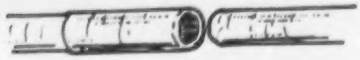

line guide
anti-reverse lever
bail pickup
drag adjustment

Appendix 3—Parts of a Fishing Rod

Ferrules

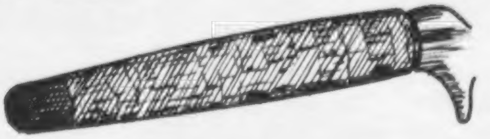


Metal

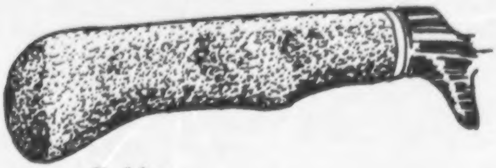


Fiberglass

Handles or Grips

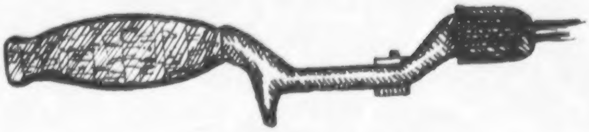


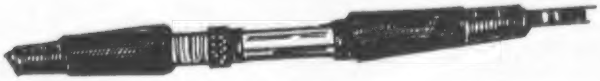
Cork



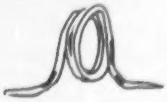
Rubber

Reel Seats

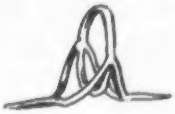




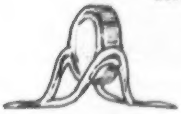
Guides



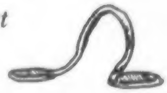
Bridge



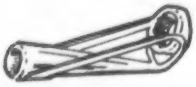
Ring



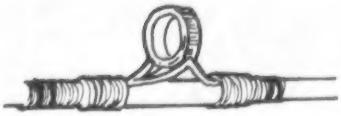
Ceramic Insert



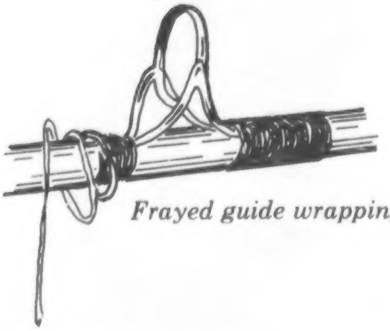
Snake



Tip-top

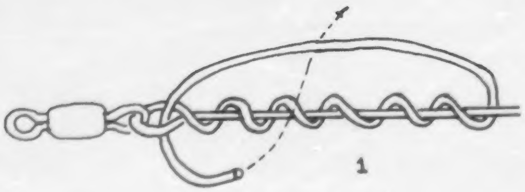


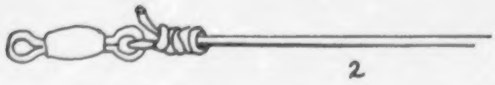
Guide wrapping



Frayed guide wrapping

Improved Clinch Knot

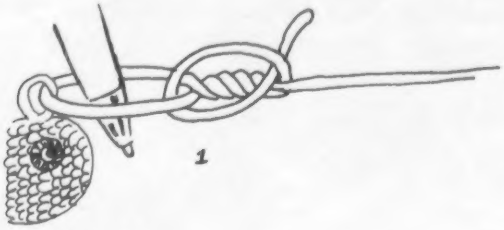


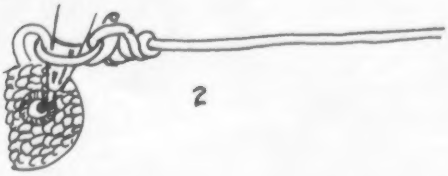


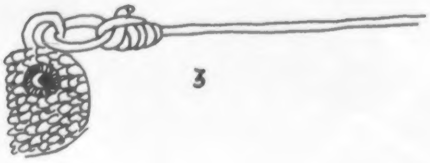
Clinch Knot

To tie a regular Clinch Knot, do not pass the end of the line back through the big loop.

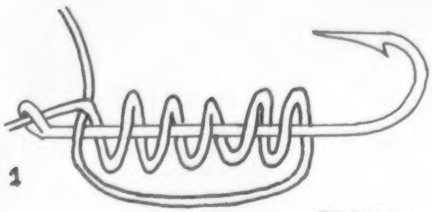
Loose Loop Clinch Knot

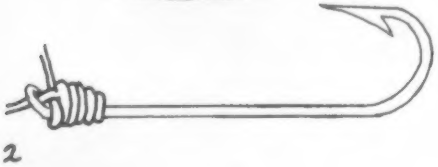




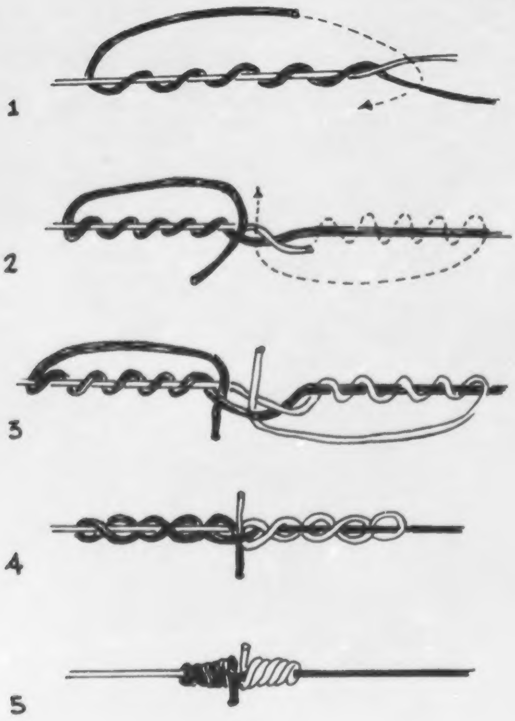


Quick Snell Knot

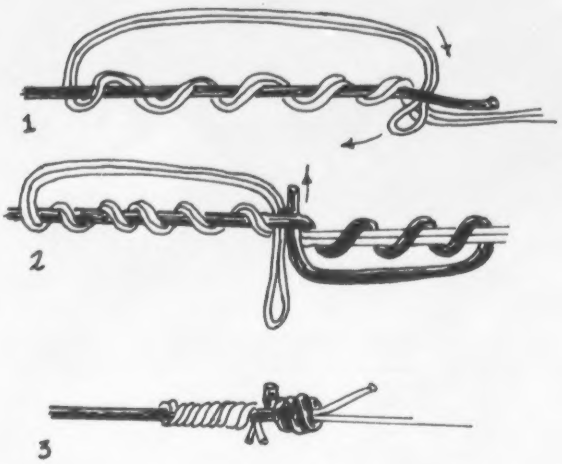




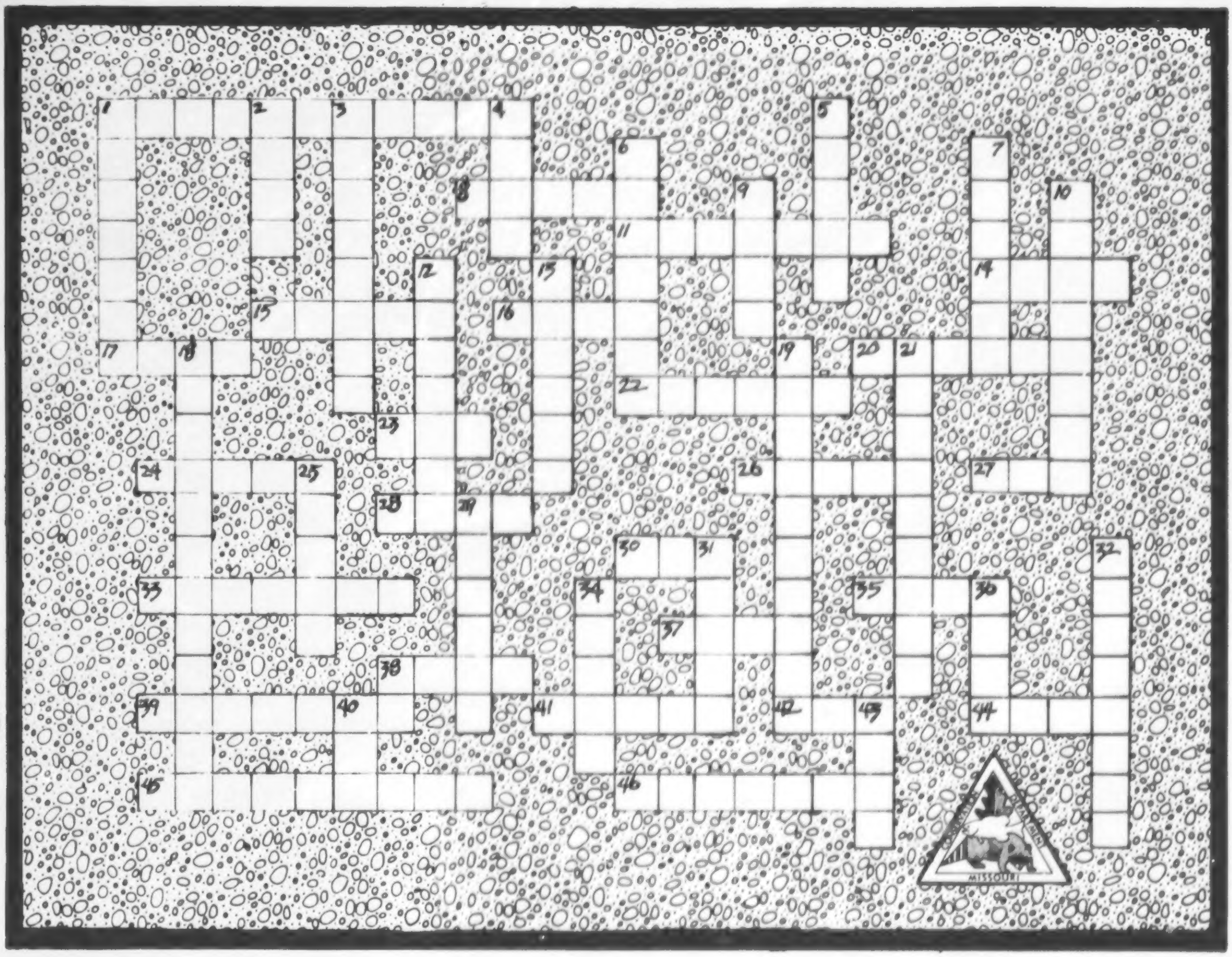
Basic Blood Knot



Double-Strand Blood Knot



Appendix 8—Casting Equipment Crossword Puzzle


1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
MISSOURI

A Design
For
Conservation
Project

Prepared by Bob Staton

Crossword Puzzle Clues

Alphabetized list of words in the crossword puzzle:

action
bait
bamboo
brake
button
cast
ceramic
clinch
drag
ferrule
flowing
floating
forge
game
gig
glass
gorge
graphite
grip
guide
handle
knot
levelwind
light
lop
lower
monofilament
nylon
pick
ratio
reel
reverse
revolve
seat
silk
sinking
slow
spincasting
spinning
stretch
stripping
test
tie
tip
trap
ultralight

ACROSS:

1. Type of reel that has a push button to release line.
8. Type of rod action in which the rod bend occurs in the upper one-third of the rod.
11. The anti-_____________ mechanism prevents the spool from rotating backwards.
14. A device often made from wooden slats, wire, or netting and used to capture fish.
15. The part of a rod that keeps the line running parallel to the rod and distributes stress equally.
16. The reel that is often considered the most accurate.
17. Sport fish are sometimes called __________ fish.
20. A common line-to-lure knot, sometimes called a fisherman's knot.
22. The part of the rod that is held during casting.
23. A reel that serves only to store line and is not used in the casting process.
24. The heavier the fishing line, the ___________ in the water it will settle.
26. The part of a reel that is sometimes called a "clicker;" it helps prevent line from coming off the spool.
27. To make a knot.
28. The reel ______________ holds the reel to the rod.
30. A type of fish spear.
33. The action of water gently moving downstream.
35. A type of thread that was common in securing guides to rods before synthetics were developed.
37. A safety device on a reel that helps prevent a large fish from breaking the line.
38. Type of rod action in which the rod bends along all or most of the rod.
39. A device used to join the pieces of a rod.
41. Old metal rods were often made using a metal furnace or ________________.
42. The weakest part of a rod.
44. 10-pound-______________ line.
45. The ______________ guide on a fly rod is the guide closest to the handle.
46. ______________ insert guides are best for protecting line from friction and wear.

DOWN:

1. A type of fly line that does not float.
2. The act of throwing a plug or bait.
3. The type of reel that is considered the best reel for distance casts.
4. The proper __________________ on a rod handle is important in casting.

5. Solid ______________ rods were popular until hollow fiberglass rods were invented.
6. An important characteristic of fishing line is how much ______________ it can achieve without breaking.
7. Spin-cast reels are sometimes referred to as "push-__________" reels.
9. The part of casting equipment that stores and retrieves the line.
10. A new type of rod material that is lighter and more sensitive than fiberglass.
12. When a bait-casting reel handle is turned, it causes the spool to ______________.
13. A type of plant that was used to make early fly rods.
18. The name given to a single strand of synthetic fishing line.
19. The name given to small, lightweight casting equipment.
21. The part of a bait-casting reel that insures the line is retrieved evenly on the spool.
25. The gear ______________ of reels determines how many revolutions the spool turns each time the reel handle is turned.
29. The term that describes how a rod will bend.
31. Forerunner of the fishing hook; it consisted of a bone or stick tapered at each end with a groove in the middle to hold the line.
32. A type of fly line that doesn't sink.
34. Braided ______________ makes a good fly line backing.
36. Improved clinch ______________.
38. Abbreviation for southeast.
40. A bait-casting reel without a lead wind would allow the line to be retrieved ______________-sided on the spool.
43. Spinning and spin-casting reels have a line ______________-up device to catch the line and wind it onto the spool.

Student Handout

Appendix 6—Personal Casting Equipment Selection Guide

Name ____________________

Information on equipment can be filled out by visiting any sporting goods, hardware, or department store that sells fishing equipment.

Type or types of fish you want to catch: ____________________

Type of bait or lures you will use: ____________________

Size of bait or lures you will use: ____________________

Type of rod you would select: ____________________

Why did you choose? ____________________

Length of rod: ____________________

Why did you choose? ____________________

Action of rod: ____________________

Why did you choose? ____________________

Type of reel you would select: ____________________

Why did you choose? ____________________

Type of line you would select: ____________________

Why did you choose? ____________________

Weight of line you would select: ______________________

Why did you choose? ______________________

____

____

What gear ratio of reel would you select? ______________________

Why did you choose? ______________________

____

____

How would you replace the line on your reel? ______________________

____

____

How would you lubricate your reel? ______________________

____

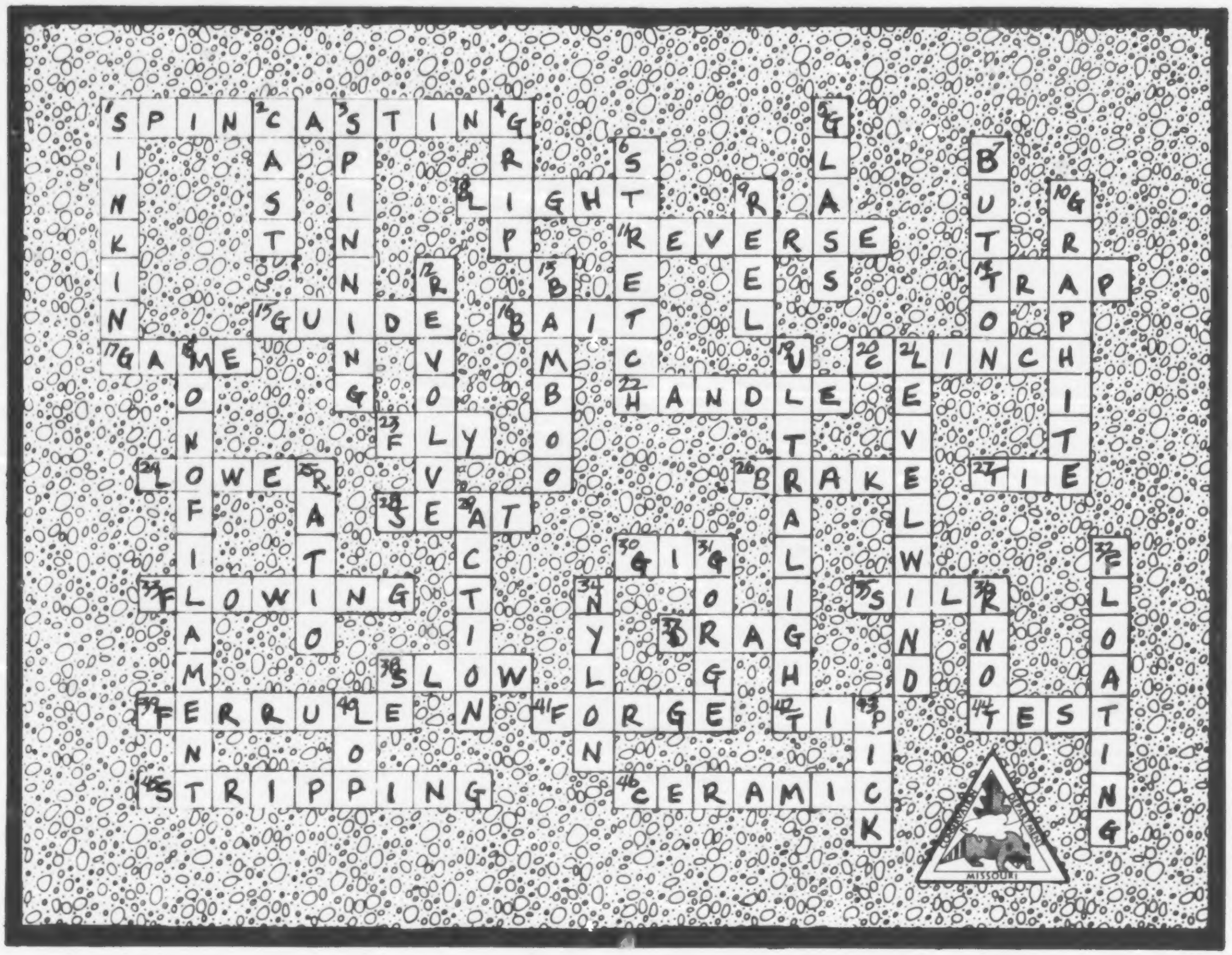
____

How would you clean and store your rod and reel? ______________________

____

____

Instructor's Key to Crossword Puzzle


1 SPINCASTING
8 LIGHT
11 REVERSE
14 TRAP
15 GUIDE
16 BAIT
17 GAME
20 CLINCH
22 HANDLE
23 FLY
24 LOWER
26 BRAKE
27 TIE
28 SEAT
30 GIG
33 FLOWING
35 SILK
37 DRAG
38 SLOW
39 FERRULE
41 FORGE
42 TIP
44 TEST
45 STRIPPING
46 CERAMIC
1 SINKING
2 CAST
3 SPINNING
4 GRIP
5 GLASS
6 STRETCH
7 BUTTON
9 REEL
10 GRAPHITE
12 REVOLVE
13 BAMBOO
18 MONOFILAMENT
19 ULTRALIGHT
21 LEVELWIND
25 RATIO
29 ACTION
31 GORGE
32 FLOATING
34 NYLON
36 KNOT
40 LOOP
43 PICK
MISSOURI

Specialists' Regions

Northwest Area
Louis F. Diebold
P.O. Box 26
Savannah, MO 64485
816/324-4672

Northeast Area
Wayne Martin
1710 E. McPherson
Kirksville, MO 63501
816/665-8075

St. Louis Area
Patti Baker
818 Meramec Station Road
St. Louis, MO 63088
314/225-6402

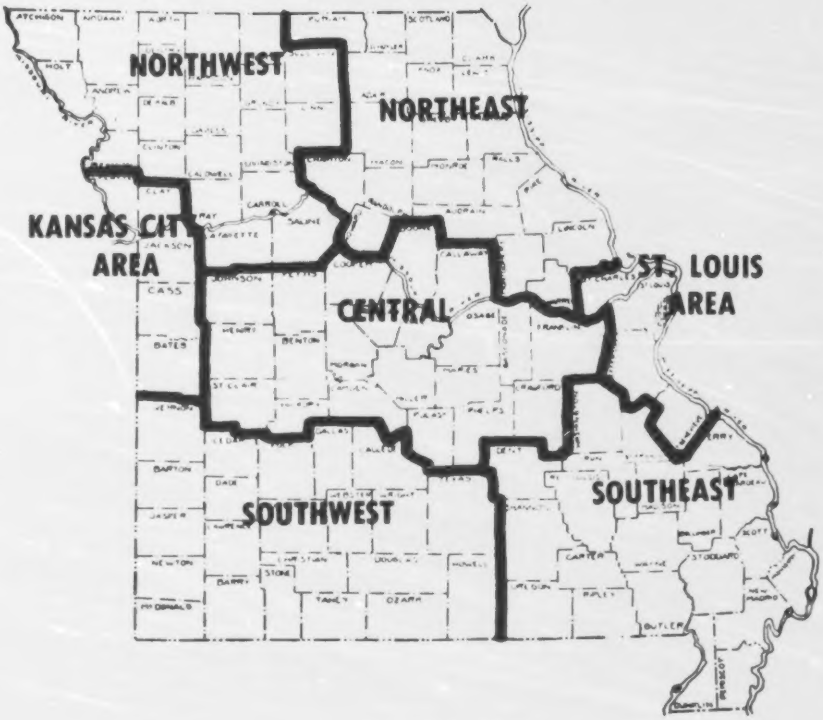
Southeast Area
Stephen J. Wilson
318 East Neal Street
Jackson, MO 63755
314/243-1143

Southwest Area
Richard Flint
214 West Pleasant
Aurora, MO 65605
417/678-2445

Kansas City Area
Lloyd Williams
Kansas City Sub-Office
Brywood Shopping Center
8618 East 63rd Street
Kansas City, MO 64133
816/356-2280

Central Area
Robert D. Staton, Jr.
303B North High Street
California, MO 65018
314/796-2669

Outdoor Skills Education Specialists will assist you in obtaining materials and scheduling equipment and films that are available from the Department of Conservation. They also offer workshops to provide training in several outdoor skills.



Consultants' Regions

District 1
Rodney J. Green
408 South Polk
Albany, MO 64402
816/726-3677

District 2
Hollis D. Crawford
Route 1, Box 21
Gibbs, MO 63540
816/332-7278

District 3
Neil W. Jenkins
Route 3, Box 64
Lee's Summit, MO 64063
816/524-6196

District 4
Charles D. Jordan
620 Hillcrest Drive
Knob Noster, MO 65336
816/563-3738

District 5
Wendell Jeffery
Route 5, Box 23
Eldon, MO 65026
314/392-3217

District 6
Al Palladino
Virginia Village; Apt. 203-B3
Warrenton, MO 63383
314/456-4208

District 7
Harold W. Thiele
7414 Dalgren
St. Louis, MO 63123
314/842-3870

District 8
Jack C. Woodhead
326 Cerny
Eureka, MO 63025
314/587-2076

District 9
Ross Allen
P.O. Box 3945
Glenstone Station
Springfield, MO 65804
417/881-6698

District 10
Virgil L. Davis
803 Summerfield
Houston, MO 65483
417/967-2123

District 11
Gordon S. Griffin
806 Sherman Avenue
Charleston, MO 63834
314/683-6940

District 13
David B. Knisley
1409 San Miguel Lane
Fenton, MO 63026
314/225-3198

District 14
Larry Behrens
407 East Walnut
Shelbina, MO 63468
314/588-4252

District 15
Jim Pyland
Route 2, Box 64D
Kearney, MO 64060
816/676-3855